

**COMPLAINT COUNSEL'S  
PROPOSED FINDINGS OF FACT,  
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AND ORDER**

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**UNITED STATES OF AMERICA  
BEFORE THE FEDERAL TRADE COMMISSION**

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**DOCKET NO. 9305**

**PUBLIC VERSION**

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**IN THE MATTER OF  
UNION OIL COMPANY OF CALIFORNIA**

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**COMPLAINT COUNSEL'S PROPOSED  
FINDINGS OF FACT**

**(VOLUME III)**

**XIII. CARB Issued Proposed Phase 2 Reformulated Gasoline  
Regulations That Incorporated Unocal's 5/14 Research Results.**

**A. Summary of the Proposed Regulations.**

2039. CARB formally proposed a Phase 2 regulation on October 4, 1991, issuing with that proposal a detailed Staff Report and detailed Technical Support Document. (CX 5; CX 52).
2040. CARB issued an accompanying Notice of Public Hearing providing a public Board meeting for November 21-22, 1991. (CX 767).
2041. The proposed Phase 2 regulations specified mandatory limits for eight gasoline properties: (1) Reid Vapor Pressure ("RVP"), (2) benzene, (3) sulfur, (4) aromatics, (5) olefins, (6) oxygen, (7) T50, and (8) T90. (CX 5 at 105; CX 52 at 010).

2042. The proposed mandatory specifications portion of the CARB Phase 2 regulations were as follows:

**October 1991 Proposed CARB Phase 2 Summertime RFG Regulations**

<b>Fuel Property</b>	<b>Flat Limit</b>	<b>Averaging Standard</b>	<b>Cap</b>
Sulfur, wt. ppm	40	30	80
Benzene, vol. %	1	0.8	1.2
Olefins, vol. %	5	--	10
Oxygen, wt. %	1.8-2.2	---	2.7 (max.)
T90, °F	300	--	330
T50, °F	210	--	220
Aromatics, vol. %	25	20	30
RVP, psi	7	---	7

(CX 5 at 105; CX 52 at 010)

2043. Oil refiners could comply with the Phase 2 regulations by meeting the “flat limits,” the “averaging limits” (for some parameters), or through “vehicle testing.” (CX 55 at 011). CARB also stated an intent to develop a predictive model as an alternative method of compliance. (CX 55 at 011).
2044. One way to comply with Phase 2 regulations is to make a fuel with property values at or below the flat limits. Each fuel parameter must not exceed the corresponding flat limit set forth in the regulations. (CX 55 at 011).
2045. The second method of compliance in the proposed Phase 2 regulations was “averaging limits.” The averaging limits provide refiners with flexibility to create different fuel compositions, so long as, on average, the refinery produces fuel that meets CARB’s emissions reductions standards. The averaging option allows refiners to account for variations in batches of fuel – the average of all batches within a certain time period must meet the averaging limit, as opposed to having each batch meet the flat limit. (CX 55 at 011); *see also* (Cal. Code Regs. Tit. 13 § 2264 (1992)).
2046. The proposed regulations contained a placeholder for a third method of compliance termed the “predictive model.” CARB intended to develop a model to permit refiners

flexibility to exceed flat limits if the model predicted that the fuel would still achieve the emission reductions of fuel manufactured to flat limit specifications. (CX 54 at 007).

2047. Certain regulated properties, such as T50 and T90, had “cap” limits as well. These “cap” limits can not be exceeded, even downstream. The Staff Report and Technical Support document stated that any predictive model that staff developed would be subject to the “caps” in the mandatory specifications. (CX 52 at 030, 039-040, CX 5 at 104-105).
2048. CARB Phase 2 Regulations offered a fourth method of compliance with Phase 2 regulations was “vehicle emissions testing.” This method of compliance has never been used. Vehicle emissions testing requires certification of an alternative gasoline formulation based on results of a vehicle emissions testing program. (Cal. Code Regs. Tit. 13 § 2266 (1992)). (CX 55 at 011).
2049. Because the averaging, predictive model, and vehicle testing methods of compliance provide flexibility for refiners, having a cap serves an important enforcement role. CARB staff noted in the 1991 staff proposal the importance of caps – “[t]he ability to detect violations through field testing can be a significant deterrent to intentional violations, and can encourage more vigorous quality control [programs].” (CX 52 at 040).

**B. CARB Relied on Unocal's Research in Developing the Phase 2 Reformulated Gasoline Regulations.**

**1. CARB Staff Relied on Unocal’s Research to Incorporate a T50 Specification in the Proposed Regulations.**

2050. Peter Venturini, the lead manager of the Phase 2 project, identified the substantial evidence to support a T50 specification as “the test program that Unocal presented to us.” (Venturini, Tr. 148); *see also* (CCPF ¶¶ 2051-2077, 4063-4146).
2051. CARB’s Final Statement of Reasons similarly stated that “the results of this [Unocal 5/14] study” that formed “the basis for the T50 specification.” (CX 10 at 075; Venturini, Tr. 294-296).
2052. By late October 1991, Mr. Lamb understood that Unocal had provided CARB all of its test results relating to the 5/14 Project, including the database, equations, and presentation slides. (Lamb, Tr. 2072-2073).
2053. In October 1991, Dr. Croudace reviewed CARB’s Technical Support Document for “scientific accuracy and relevance” pursuant to a request that Mr. Lamb had made to Unocal’s Science and Technology division. (CX 301 at 001; Lamb, Tr. 2070-2071; Croudace, Tr. 480-481).

2054. In October 1991, Mr. Lamb understood that CARB's Technical Support Document included references to Unocal's research results. (Lamb, Tr. 2073).
2055. Dr. Croudace testified that, after the CARB regulations were issued, Dr. Jessup and Dr. Croudace "were very happy" that CARB was "using our invention in part of it." Drs. Jessup and Croudace "wished they [CARB] had used it in all, but there was a lot of information that was used to come up with their [CARB's] Phase 2 document." (Croudace, Tr. 577-578).
2056. CARB staff decided to incorporate a T50 specification in the October proposed rule because of Unocal's research. (Fletcher, Tr. 6486; Venturini, Tr. 141, 148; Courtis, Tr. 5764). The October 1991 Staff Report refers directly to Unocal's research results, noting the Unocal has "conducted studies showing that reducing T50 results in a decrease in emissions of volatile organic compounds and carbon monoxide, and has no significant effect on emissions of oxides of nitrogen. The Unocal results indicate that a 10 degree reduction in T50 results in a nine percent decrease in volatile organic compound emissions and a five percent decrease in carbon monoxide emissions." (CX 52 at 033; Fletcher, Tr. 6468).
2057. The Technical Support Document for the Phase 2 RFG rulemaking highlighted CARB's reliance on Unocal's emissions research results in the development of the Phase 2 RFG regulations. (CX 5 at 028-033, 299-300; Courtis, Tr. 5740).
2058. John Courtis personally used information from Unocal to co-author the Phase 2 Technical Support Document. (Courtis, Tr. 5740; CX 5 at 031-033, 299-300).
2059. CARB on October 4, 1991, formally proposed a Phase 2 regulation. That proposal included a specification requiring a flat limit of 210 degrees F for T50. (CX 5 at 105; CX 52 at 040).
2060. Peter Venturini and his staff relied on Unocal's research in deciding to incorporate the T50 specification in its proposed rule. (Venturini, Tr. 141).
2061. The CARB Board at a November 21-22 hearing approved an amended version of the Phase 2 rule. That version carried forward a T50 specification with a flat limit of 210. (CX 870).
2062. CARB in its Final Statement of Reasons in October 1992 stated, "In fact, Unocal has evaluated the effects of T50, and it is the results from this study that form the basis for the T50 specification." (CX 10 at 075).
2063. CARB in the Final Statement of Reasons also stated that "[t]he limit on T50 was necessarily based on other work (Unocal) because the Auto/Oil work did not examine T50 as discussed in Comment 61." (CX 10 at 048).

2064. CARB in the Final Statement of Reasons stated that “The Unocal study was used in the discussion of the effect of T50 on emissions because it is the only study that evaluated T50 and provided a statistical analysis.” (CX 10 at 075).
2065. CARB in the Final Statement also singled out Unocal as the one T50 study that did independently control for T50's effects, stating, “Unocal tested an extensive fuel matrix which included T50 as one design variable. . . . The Auto/Oil study did not include T50 as a variable. It was designed to discern the effects of aromatics, MTBE, olefins and T90. Any attempt to discern an effect of T50 in the Auto./Oil data will be confounded by the effects of these four actual variables. Therefore, the Unocal work should provide a superior estimate of the effect of T50 on emissions.” (CX 10 at 047). Peter Venturini approved that statement as accurate. (Venturini, Tr. 294-295).
2066. Unocal knew in October 1991 that CARB staff had relied on Unocal’s research to support the T50 specification. Staff’s Technical Support Document was replete with references giving credit to Unocal’s research. (CX 5 at 033 (a chart entitled “Sensitivity Analysis of T50 Changes on Exhaust Emissions Using the Unocal Regression”); CX 5 at 028 (CARB used Unocal’s regression equations “[i]n order to evaluate the sensitivity of emissions to T50 changes.”); CX 5 at 033 (CARB chose a specific T50 limit value of 210 degrees Fahrenheit for T50 based on “[t]he results of the analysis shown in Table II-11” of the Technical Support Document – i.e., the regression analysis using Unocal’s equation.); CX 5 at 299-300 (Unocal regression equations published at Appendix 11 of the Technical Support Document.); CX 5 at 031-032 (charts taken from June 20, 1991 presentation)).
2067. The CARB mandatory specifications were approved by the Office of Administrative Law (“OAL”) on November 16, 1992. (CX 1811). That Phase 2 rule incorporated the T50 specification approved by the Board in November 1991. (CX 1811).

## **2. CARB Used Unocal’s Regression Equations to Develop the Phase 2 Reformulated Gasoline Regulations.**

2068. Unocal provided CARB with the equations it developed from its 10-car study on July 1, 1991. (CX 25).
2069. Unocal also provided CARB with a computer disk containing data from Unocal’s 10-car program on or within a few days of July 25, 1991. (CX 1247; Jessup, Tr. 1538-1541).
2070. Mr. Curtis personally used data provided by Unocal to put together the October 1991 CARB staff proposal. Data housed by CARB at the Teale Data Center includes data from Unocal that Mr. Curtis “used to verify the regression equations that were provided to us by Unocal.” (Curtis, Tr. 5777-5779; CX 1810 at 005).

2071. Mr. Courtis used data from Unocal prior to the November 1991 board hearing “because we had to look at the background information behind all the regression equations that we had, and that’s what we did.” (Courtis, Tr. 5941).
2072. One of the files housed at the Teale Data Center with UNOCAL in the title has a creation date listed as August 2, 1991. (CX 7045 (Cleary, Dep. at 78-79); RX 122 at 005 (used as CX 1810 at trial)).
2073. The Technical Support Document explained that CARB used the Unocal regression equation: “In order to evaluate the sensitivity of emissions to T50 changes, staff have used the Unocal regression equation (See Appendix 11).” (CX 5 at 028, 299-300).
2074. CARB published Unocal’s regression equation from the July 1, 1991 letter to CARB at Appendix 11 of the Technical Support Document. (CX 5 at 299-300; CX 25 at 002; Lamb, Tr. 1837).
2075. A table in the Technical Support Document depicts the results of CARB’s analysis using Unocal’s regression equation. The title read: “Table II-11: Sensitivity Analysis of T50 Changes on Exhaust Emissions Using Unocal Regression.” (CX 5 at 033).
2076. In the Technical Support Document chart titled “Sensitivity Analysis of T50 Changes on Exhaust Emissions Using the Unocal Regression,” the term “Unocal Regression” referred to information provided to CARB by Unocal. (Courtis, Tr. 5738; CX 5 at 033).
2077. CARB chose a specific T50 value of 210 degrees Fahrenheit based on “[t]he results of the analysis shown in Table II-11” of the Technical Support Document – *i.e.*, the regression analysis using Unocal’s equation. (CX 5 at 033).

### **3. CARB Included Unocal’s Presentation Slides as Technical Support for the Phase 2 Reformulated Gasoline Regulations.**

2078. CARB staff gathered, made copies, and made available to the public as part of the rulemaking record each document relied on during the rulemaking that CARB staff referenced in either the staff report or technical support document. (Fletcher, Tr. 6466).
2079. The Technical Support Document list of references included #82: “Jessup, Peter, et al ‘Unocal Reformulated Fuels Technology- A Truly Innovative Approach’ Presentation to ARB, 1991.” (CX 5 at 171).
2080. CARB staff wrote the number “82” the first page of the slides for the June 21, 1991 presentation by Unocal to indicate the reference number on the technical support document. The reference referred to the whole presentation. (CX 24 at 001; CX 5 at 171; Fletcher, Tr. 6465-6466; Lamb, Tr. 1987-1988).

2081. Technical Support Document Figure II-14, titled “Hydrocarbon Emissions Effects of Distillation T50” came from the presentation to CARB from Unocal on June 20, 1991. (CX 5 at 031; CX 24 at 026).
2082. Technical Support Document Figure II-15, titled, “CO Emissions Effects of Distillation T50” came from the presentation to CARB from Unocal on June 20, 1991. (CX 5 at 032; CX 24 at 028).

**C. CARB Staff Conducted an Analysis of Expected Costs for the Phase 2 Reformulated Gasoline Regulations.**

2083. CARB actively sought cost information for a cost analysis. (CCPF ¶¶ 1350-1370).
2084. The rulemaking documents set forth a cost analysis showing that the added cost of production of Phase 2 would be about 12 to 16 cents per gallon. (CX 52 at 071). CARB further estimated that “based on cost data submitted to the Board, the staff has determined that the regulations will cost between 14 cents per gallon to 20 cents per gallon, if the entire cost is passed to the consumer,” taking into account a fuel economy penalty. (CX 767 at 009; CX 52 at 071-072).

**XIV. Unocal Continued to Conceal Its Scheme in Interactions with CARB Prior to the CARB Board Hearing on November 21, 1991.**

**A. Prior to an October 29, 1991 Meeting with CARB Staff, Unocal Had Internal Discussions About What Concerns to Raise with CARB.**

2085. In October 1991, prior to the CARB hearing in November 1991, Unocal held internal Unocal discussions concerning Unocal’s position on the proposed CARB Phase 2 regulations. (CX 295 (10/14/91 Letter from Lamb to Felderman, VP of Refining); CX 702 at 003-004 (10/10/91 Fuels Issues Team Minutes)).
2086. In early October 1991, Mr. Lamb reviewed the Technical Support Document. He recognized that “CARB had not proposed to average T50. We thought they might. We were interested in seeing an averaging proposal. . . It was under consideration, but it wasn’t included in the proposal yet.” Lamb raised with CARB his concerns about the specific numbers for averaging for T50. Lamb believed that CARB made an “incorrect assumption” about production for T50, and he took that concern to CARB staff because if CARB set the average for T50 based on the “incorrect assumption,”...“it would be much more costly to do.” (Lamb, Tr. 2272, 2283-2284).
2087. Unocal scheduled and participated in a private meeting with CARB where it raised its concerns and made its positions on the proposed Phase 2 RFG regulations known to CARB. (CX 295 at 001).

2088. On October 14, 1991, Mr. Lamb sent a memorandum to Unocal's Vice President of Refining, relating to the proposed CARB Phase 2 regulations. With copies to high level Unocal managers such as Roger Beach and Don D'Zurilla (Lamb, Tr. 2053-2054; CX 295 at 001). Mr. Lamb gave notice that Unocal personnel would be meeting with CARB staff later that month to discuss "the two or three major problems Unocal has with the proposal." (CX 295 at 001; Lamb Tr. 2052-2053).
2089. In the October 14, 1991 memorandum that discussed the "two or three major problems" Unocal had identified with the CARB Phase 2 RFG regulation proposal, did not include the T50 specification. (Lamb, Tr. 2053).
2090. In the October 14, 1991 memorandum that discussed the "two or three major problems" Unocal had with the CARB Phase 2 RFG regulation proposal, there was no mention of the proposed cap limits. (Lamb, Tr. 2053).
2091. In September 1991, Unocal had received advance notice, prior to the public distribution of the proposed CARB Phase 2 regulations in October 1991. (CX 702 at 003 (Minutes of September 27, 1991 Unocal Fuel Issues Team); Lamb, Tr. 2054-2057). Mr. Kulakowski received advance notice of the proposed CARB Phase 2 specification prior to the publication of the CARB technical support document. (CX 702 at 003; Lamb, Tr. 2054-2055). Unocal received advance notice that the proposed regulations would include cap limits. (CX 702 at 003; Lamb, Tr. 2055-2056).
2092. Unocal's Denny Lamb, views nothing inappropriate or unusual about communications between Unocal and CARB in which Unocal received advance notice about the proposed Phase 2 RFG specifications. (Lamb, Tr. 2057-2058).
2093. Unocal's Fuels Issues Team met on October 25, 1991 to discuss the scheduled meeting with CARB on October 29, 1991 concerning the proposed CARB Phase 2 RFG regulations. (CX 288 at 006; Lamb, Tr. 2061-2062). Fuels Issues Team minutes reflect discussions about the need to obtain adjustment of certain specifications "[i]n order for Unocal to support CARB's proposed regulations." (CX 288 at 006; Lamb, Tr. 2063).
2094. The Fuels Issues Team minutes from October 25, 1991 detail issues "[o]f major concern" and "[o]f concern" to Unocal from the proposed CARB Phase 2 RFG regulations. (CX 288 at 006; Lamb, Tr. 2062-2063).
2095. The Fuels Issues Team did not identify as an issue of "major concern" or "of concern" the proposed cap limits (CX 288 at 006; Lamb, Tr. 2062-2063).
2096. The Fuels Issues Team minutes from October 25, 1991 does not discuss seeking the elimination of the proposed cap limits. (CX 288 at 006; Lamb, Tr. 2063-2064).
2097. The Fuels Issues Team did not discuss at the October 25, 1991 meeting the elimination or

abolition of the proposed T50 specification. (CX 288; Lamb, Tr. 2064).

2098. The Fuels Issues Team identified concerns about an averaging limit for T50. It sought to adjust the averaging limit for the T50 specification to 205 degrees Fahrenheit. (CX 288 at 006; Lamb, Tr. 2064).
2099. The proposed agenda for Unocal's October 25, 1991 meeting with CARB lists in the first bullet point the following objective: "Find common ground for support of CARB proposals." (CX 449 at 001; Lamb, Tr. 2065-2066). In October 1991, Unocal in general, and the Fuels Issues Team, in particular, undertook a strategy to find "common ground" for support of the CARB proposals because Mr. Lamb understood the inevitability CARB Phase 2 RFG regulations (Lamb, Tr. 2066).
2100. Unocal left CARB with the second page of the Unocal proposed agenda for the October 1991 meeting. (*Compare* CX 449 at 002 *with* CX 32 at 001).
2101. The Unocal proposed agenda for the October 1991 meeting with CARB reflects that Unocal took exception to and opposed the RFG testing or vehicle testing option. (CX 449 at 002; CX 32 at 001; Lamb, Tr. 2067).
2102. The Unocal proposed agenda for the October 1991 meeting with CARB reflects that Unocal supported the development of the predictive model. (CX 449 at 002; CX 32 at 001; Lamb, Tr. 2068).

**B. Unocal Met With CARB Staff on October 29, 1991 to Discuss Unocal's Concerns.**

2103. Staff's October 4, 1991 Phase 2 proposal solicited public comments for a 45-day period, and CARB staff considered the resulting comments in preparation for the CARB Board meeting, which took place on November 21-22, 1991. (CX 767).
2104. Following CARB's publication of the Staff Report and Technical Support Document, Unocal representatives met with CARB staff, including Peter Venturini, on October 29, 1991 to discuss the proposed rule. (Venturini, Tr. 275- 277; CX 32; CX 1558).
2105. In October 1991, Unocal wanted certainty with respect to the proposed CARB Phase 2 RFG regulations. As reflected in documents relating to the October 1991 Unocal meeting with CARB, Unocal conveyed the message that the company wanted certainty from CARB with respect to both the specifications and the predictive model. (Lamb, Tr. 2068-2069; CX 449 at 002; CX 32 at 001 ("Certainty must be the same with specs or model")).
2106. Unocal wanted certainty in October 1991 concerning the proposed Phase 2 regulations because it did not want changes to the specifications or regulations after Unocal had

- begun to spend money making enormous capital investments required to modify its refineries. (Lamb, Tr. 2069).
2107. Unocal raised with CARB staff issues of concern to the company, as reflected in the October 29, 1991 meeting materials and Fuels Issues Team minutes, in an effort to find “common ground” to support the CARB Phase 2 RFG regulations. (Lamb, Tr. 2069; CX 449; CX 32; CX 288).
  2108. Unocal representatives at the October 29, 1991 meeting with CARB staff did not object to the proposed T50 cap. (Venturini, Tr. 276; CX32 at 001).
  2109. Unocal at a meeting with CARB staff on October 29, 1991 asked CARB staff to consider fixing the T50 specification to allow an average of 205 degrees F. (Venturini, Tr. 276-277; CX 32).
  2110. At both the Unocal meeting with CARB staff in late October 1991, and at the board hearing in November 1991, Mr. Lamb never recommended that CARB staff eliminate the T50 specification. (Lamb, Tr. 2070).
  2111. Mr. Lamb did not raise any complaints concerning CARB’s use of Unocal’s research results and publication of Unocal’s information in its CARB Phase 2 RFG rulemaking documents. (Lamb, Tr. 1837).
  2112. CARB staff also recall that Unocal never recommended to CARB staff, at any time before the Board meeting on November 21, 1991, that staff delete the T50 specification from its October 4, 1991 proposed rule. (Venturini, Tr. 279-281; CX 32; CX 33).
  2113. Mr. Lamb, as a member of Unocal’s management, received information that Unocal’s scientists evaluating the October 1991 proposed regulations had “no qualms” about a proposed T50 specification “based on the Unocal vehicle testing.” (Lamb, Tr. 2072; CX 301 at 001; Croudace, Tr. 481-482).
  2114. Unocal informed CARB staff prior to the November 21, 1991 CARB hearing that Unocal set aside one billion dollars to comply with Phase 2. (Venturini, Tr. 282).
  2115. CARB staff in developing Phase 2 relied on Unocal’s assertion that it would cost one billion dollars as part of its consideration of cost in promulgating the Phase 2 rule. (Venturini, Tr. 282).
  2116. Staff in November also met with Turner Mason representatives and received cost information that, unknown to its authors, omitted the significant added potential cost of Unocal’s plan to charge royalties. (CCPF ¶¶ 1975-1983, 1988-1994, 1999, 2002-2007, 2124-2128).

## **XV. CARB Approved Phase 2 Reformulated Gasoline Regulations at a Board Hearing on November 21-22, 1991.**

### **A. Unocal In Its Formal Comments and Testimony on the Phase 2 Regulations Failed to Disclose the Pending Patent and Withheld Criticism of T50.**

2117. On November 21, 1991, Roger Beach submitted Unocal's written comments to CARB concerning the proposed Phase 2 RFG regulations. Mr. Lamb helped draft the formal written comments and included a cover letter summarizing Unocal's position on the proposed Phase 2 RFG regulations and an attachment containing more detailed and technical comments (CX 33; Lamb, Tr. 2075, 2077-2078).
2118. Unocal's written comments to CARB of November 21, 1991 do not contain any statement or comment opposing or taking exception to the proposed T50 specification. Unocal does not set forth any opposition to the T50 specification in the cover letter that summarizes Unocal's position on the Phase 2 regulations (CX 33; Lamb, Tr. 2078-2079).
2119. Mr. Lamb prepared written remarks that he had on hand for his oral testimony before the CARB Board on November 21, 1991. (CX 34; Lamb, Tr. 2081). Mr. Lamb imparted most of what was contained in his written remarks at the November 1991 hearing; and while he answered some questions, he essentially stuck to his script. (Lamb, Tr. 2082).
2120. The written remarks prepared by Mr. Lamb in preparation for his oral testimony at the November 1991 CARB hearing contain no statement or suggestion to eliminate the proposed cap limits on any specification. (Lamb, Tr. 2084, 2086).
2121. Dennis Lamb's written version of his oral testimony at the November 21-22, 1991 Board hearing on Phase 2 focused on RVP and sulfur, and omitted any mention of T50. (CX 34).
2122. Dennis Lamb of Unocal, when asked at the hearing about its views on T50, responded, "And we did find that T50 was an important parameter. . . . We don't see the spec for T50 as necessary. We haven't taken some exception to it as some others have. But I wouldn't disagree with the position that it could probably go away, and it really wouldn't change what's happening with T50." (CX 774 at 045).
2123. Mr. Kulakowski, who worked day to day with Mr. Lamb on the Phase 2 regulations, did not recall anyone ever telling CARB that Unocal opposed the T50 specification. (Kulakowski, Tr. 4520).

### **B. CARB Staff Proposed a Less Costly Regulation Based Largely Upon Information in WSPA's Turner Mason Study.**

2124. During the 45-day comment period following the publication of the rulemaking documents, Turner Mason had submitted a cost study to CARB on behalf of WSPA. The Turner Mason study estimated the cost of the Phase 2 RFG to range from about 15 to 30 cents per gallon. (CX 1106; CCPF ¶¶ 1976, 1990, 1995-1996).
2125. CARB staff considered Turner Mason's preliminary results between the release of staff proposal in early October 1991 and the November board hearing. Turner Mason's indication that expanding averaging would reduce costs played a role in alternative proposals staff made to the CARB board. (Courtis, Tr. 5768-5769).
2126. Mr. Courtis based his review and comments on the Turner Mason study on the draft report he received subsequent to CARB staff's October 1991 proposal. Mr. Courtis read the final report, which had no significant changes from the draft report, that Turner Mason provided prior to the November 1991 Board hearing. (Courtis, Tr. 5876-5877, 5878-5879; CX 1106; CX 1517).
2127. CARB staff had confidence in its cost estimates because it was based "on data resulting from studies produced by refineries specific to their facilities." (CX 10 at 096 (CARB Oct. 1992 Final Statement of Reasons)).
2128. CARB staff, despite its disagreement with Turner Mason's ultimate conclusions, relied on the study's cost information about "averaging" provisions to refashion a lower-cost proposed rule to present to the CARB Board in November 1991. (Venturini, Tr. 270-271; CX 10 at 096).
2129. At the CARB Board hearing, Robert Fletcher presented CARB staff's modified proposal that contained relaxed limits for some of the proposed specifications. CARB staff explained at the November 21, 1991 hearing that this modified proposal achieved much of the emissions benefits proposed by the October 4, 1991 specifications but at a reduced cost to the industry. (CX 773 at 061-064 (CARB Hearing Transcript, November 21, 1991)).
2130. After CARB staff presented its proposed regulations in the technical support document and staff report in October 1991, staff presented a revised proposal "in order to reduce the costs associated with the original proposal." Both of these staff proposals, as well as the regulations actually adopted, had technical support, according to Mr. Courtis, who conducted a technical analysis of these proposals. (Courtis, Tr. 5767-5768).
2131. CARB staff presented an alternative proposal at the November 1991 board hearing. The board took testimony from witnesses at the hearing and a board member looked at other, more stringent specifications than CARB staff's alternative proposal. The adopted proposal resulted from this process. (Fletcher, Tr. 7019; CX 870).
2132. The Board approved final regulations that, compared to staff's October 4<sup>th</sup> proposal,

provided “95 percent of the emissions benefits that would have resulted from the staff’s original proposal at 85% of the cost.” (CX 10 at 091). CARB testified at the Board hearing on November 21-22, 1991 that staff’s November 18<sup>th</sup> proposal would provide only “90 to 95 percent of the mass emissions reduction of VOC and NO<sub>x</sub> compared to our original proposal . . . and provides 80 to 85 percent of the ozone reduction of our original proposal at 70 percent of the cost.” (CX 774 at 227; Venturini, Tr. 108-111).

- 2133. The Board on November 22, 1991 voted to adopt a modified version that tightened some requirements from staff’s revised proposal, but retained all the parameters and most of the specification values recommended by staff. (CX 870).
- 2134. As stated by General Counsel Kenny, “[t]he board actually also indicated that they had concerns about the cost, and at the time the board hearing was concluded, the board adopted a regulation which would cost less than the staff proposal as a result of the board making modifications to the staff proposal to reduce cost.” (Kenny, Tr. 6508-6509).
- 2135. The Final Statement of Reasons explains that the Board made its modifications to the proposed standards at the hearing “because the modifications should afford refiners significantly greater flexibility and an opportunity to significantly reduce their compliance costs.” (CX 10 at 014).
- 2136. CARB staff later generated a document to compare the original staff proposal from October 4, 1991, to the staff’s “alternative proposal” made to the board in November 1991, to the regulations adopted by the board. (CX 870; Fletcher Tr. 6947-6948).

**C. Unocal’s Research Remained the Basis for The Board’s T50 Specification.**

- 2137. The Phase 2 regulation approved by the Board carried forward staff’s recommendation that the rule regulate T50. The Board also preserved staff’s recommendation of a flat limit for T50 of 210 and “cap” of 220. (CX 870).
- 2138. At the Board hearing, Chairwoman Sharpless acknowledged that she knew about Unocal’s T50 studies and specifically asked Mr. Lamb to comment on Unocal’s findings. (CX 774 at 045).
- 2139. CARB in its Final Statement of Reasons in October 1992 stated, “In fact, Unocal has evaluated the effects of T50, and it is the results from this study that form the basis for the T50 specification.” (CX10 at 075). Peter Venturini approved that statement as accurate. (Venturini Tr. 294-295).
- 2140. CARB in the Final Statement of Reasons also stated that “[t]he limit on T50 was necessarily based on other work (Unocal) because the Auto/Oil work did not examine T50 as discussed in Comment 61.” (CX 10 at 048).

2141. CARB in the Final Statement of Reasons stated that “The Unocal study was used in the discussion of the effect of T50 on emissions because it is the only study that evaluated T50 and provided a statistical analysis.” (CX 10 at 075). Peter Venturini approved that statement as accurate. (Venturini Tr. 294-295).
2142. CARB in the Final Statement also singled out Unocal as the one T50 study that did independently control for T50's effects, stating, “Unocal tested an extensive fuel matrix which included T50 as one design variable. . . . The Auto/Oil study did not include T50 as a variable. It was designed to discern the effects of aromatics, MTBE, olefins and T90. Any attempt to discern an effect of T50 in the Auto/Oil data will be confounded by the effects of these four actual variables. Therefore, the Unocal work should provide a superior estimate of the effect of T50 on emissions.” (CX 10 at 047). Peter Venturini approved that statement as accurate. (Venturini 294-295).

**D. The CARB Board, and Unocal Itself, Publicly Expressed Concerns About Cost Issues in November 1991.**

2143. CARB Board members at the November 1991 Phase 2 Board meeting treated the potential cost impact of Phase 2 on the economy of the state as a significant issue. (Kenny, Tr. 6506).
2144. The Resolution adopted by CARB's Board members at the conclusion of the November 1991 Phase 2 hearings specifically stated that . . . “at the lowest cost to the consumer.” (CX 817 at 003; Kenny, Tr. 6509-6510).
2145. CARB Board members at the Phase 2 meeting in November 1991 were concerned not only about comparative cost of Phase 2 next to other measures, but also about the potential cost to the consumer in absolute terms. (CX 817 at 003; Kenny, Tr. 6509-6510 (“ . . . the board was concerned about the additional cost to the consumer of the Phase 2 regulations.”)).
2146. On November 21, 1991, Unocal sent CARB detailed comments to the proposed Phase 2 RFG regulations. Unocal raised technical and scientific objections to all of CARB's proposed specifications except for T50. (CX 33 at 012 (Unocal raising specific objections to the proposed specifications for aromatics); CX 33 at 010 (for oxygen); CX 33 at 007) for RVP; (CX 33 at 009) for T90; (CX 33 at 009) for sulfur; (CX 33 at 11) for olefins; (CX 33 at 014) for benzene).
2147. Unocal's Dennis Lamb testified at the November 21-22 Board hearing that a smaller refiner exemption costing 3 cents per gallon under one scenario “would destroy any ability the industry may have to recover the extensive investments being required.” (CX774 at 040-041).
2148. Lamb voiced concern over “flexibility” despite the inflexibility Unocal wished to impose

on the industry. (CX 774 at 020 (the vehicle testing alternative only gives “an illusion of flexibility.”)).

2149. CARB Chairman Sharpless at the November 22<sup>nd</sup> Board hearing directly asked Unocal how its costs would compare to ARCO’s estimate of 17 cpg and Chevron’s estimate of 15 cpg, and Unocal’s Dennis Lamb refused to give any answer citing Unocal’s purchase of a Shell facility as the reason. (CX 774 at 047-048 (Chairman Sharpless: “So you don’t have a number for what Unocal might have to charge.” Lamb: “That’s correct.”)).
2150. Dennis Lamb at the November 1991 Board hearing, while discussing the small refiner exception, explicitly told CARB Chairwoman Sharpless that Unocal expected no “windfall” from the Phase 2 regulation. (CX 774 at 041-042; Venturini, Tr. 285-286, 289).
2151. Unocal’s representative, Dennis Lamb, in the written version of his oral testimony at the CARB Phase 2 Board hearing of November 21-22, 1991, argued that adopting a predictive model would minimize capital investment and thus consumer cost. CX 34 at 003; Venturini, Tr. 289-291).
2152. Unocal’s assertion at the CARB Board hearing regarding Phase 2 on November 21-22 that adopting a predictive model would lower capital investment cost, and therefore cost to the consumer, was important to CARB staff. (Venturini, Tr. 291).

**E. The CARB Board, and Unocal Itself, Publicly Expressed Concerns About Preserving Competition at the November 1991 Hearing.**

2153. Chairman Jananne Sharpless of the CARB Board explicitly communicated to the public at the November 21-22, 1991 meeting that CARB was concerned about maintaining small refiners’ ability to supply Phase 2-compliant fuel. (Venturini, Tr. 288-289; CX 774 at 042).
2154. The Board members at the Phase 2 hearing in November 1991 explicitly expressed their concern about the potential impacts on competition of the proposed Phase 2 regulation. (Kenny, Tr. 6512-6514 (“The board was concerned about the impacts on the majors. The board was also very concerned about the impacts on the small refiners as well as the independent refiners.”)).
2155. CARB Chairman Sharpless explicitly addressed that the Board was concerned also about going too far in accommodating the small refiners to the competitive detriment of the major refiners. Discussing this concern, Chairman Sharpless stated, “So, I think the difficulty that this Board is going to have to face in dealing with the small refinery issue is how to balance these competition issues.” (CX 774 at 060-061).
2156. Board members at the Phase 2 hearing in November 1991 expressly discussed potential

competitive impacts on not only small refiners, but also independent refiners. (Kenny, Tr. 6513 (“The issue was, with regard to the independent refiners, was their ability to comply with the regulatory requirements without sending them out of business. It was the same issue that existed with regard to the small refiners.”)).

**F. The CARB Board and the Refiners at the November 1991 Hearing Publicly Expressed Their Understanding that Refiners Quickly Would Become Locked In to the Phase 2 Specifications.**

2157. CARB staff in 1991 believed that CARB would not have the option of changing the regulation once it was issued given the large investment it was asking the refiners to make. In the view of Peter Venturini, CARB’s lead manager, “We were talking about a measure that could impact California’s refineries to the tune of maybe \$5 billion or more, a regulation that could impact the consumer of ten or more cents per gallon . . . we had one shot to get this right. We knew that it was important to get it right because it would be very difficult to come back and undo it after we’ve asked the refineries to make this investment . . .” (Venturini, Tr. 108-110).
2158. CARB viewed maintaining adequate supply of gasoline as a “very important” consideration in the Phase 2 rulemaking. CARB “certainly did not want to be responsible for fuel shortages and gas lines, and so forth, so it was very important to us to make sure that we had the proper balance in the regulations between the emissions reductions, the ability to produce product and the cost to the consumer.” (Venturini, Tr. 263-264).
2159. CARB staff believed that it could not propose a Phase 2 regulation if even one major refiner reduced its participation in the California gasoline market. (Venturini, Tr. 263 (“We needed all of them on board.” . . . “we could have had a significant supply shortfall.”)).
2160. CARB later created a fuels team having the overall objective of working “together with the California refining industry to smooth their path in producing reformulated gasoline so we would be able to assure that when 1996 come we’ll have clean reformulated gasoline produced in California at the daily supplies.” (Courtis, Tr. 5723-5725, 5728-5729).
2161. CARB also understood that refiners required several years lead time in order to obtain the necessary permits and undertake the necessary planning and engineering prior to making modifications to their refineries. (CX 10 at 025)(Final Statement of Reasons, stating CARB provided refiners a five-year lead time “to permit refiners and importers to make all investment decisions regarding the methods they will use to comply with the regulations.”)).
2162. CARB Chairman Sharpless at the November hearing explicitly recognized that refiners

would have to make irreversible commitments long before the March 1996 effective date. Chairman Sharpless stated that CARB, in rejecting a suggested specification for heavy aromatics, needed to be “proceed with caution” because there would be massive capital outlays and “we either do it right now or we forego some emission reductions that we might otherwise get.” (CX 773 at 076).

2163. Unocal itself asserted at the November 21-22 Board hearing that it needed a four-year lead-time from the establishment of fixed regulations to the effective date in order to be able to save capital costs. Dennis Lamb testified that “unless we have a minimum of four years from adoption to implementation, this flexibility [of the predictive model] is lost” and stated a desire that there be a moving “48 month” period keyed to finalization of the predictive model); (CX 774 at 022, 032-033).
2164. Unocal at the November 1991 Board hearing also identified the permit process as one key reason that refiners needed so much lead time. Dennis Lamb testified, “And if we get the permits in a timely kind of way, we can meet the 1996 deadline. If we don’t, we can’t.” (CX 773 at 155).
2165. Refiners at the November 21-22 Phase 2 Board hearing asserted that even so minor a regulatory adjustment as choosing between staff’s Oct. 4th proposal and staff’s modified November proposal would have significantly different economic consequences. Mr. Trunek of ARCO testified that the difference would entail buying “different sizes of equipment, probably essentially the same processes, but in different magnitudes, so that the equipment that we purchase and install to produce the gasoline to [staff’s] modified proposal would be different than that equipment which would be economic to install for the October 4 proposal.” (CX 773 at 185-186).
2166. Unocal later filed comments consistent with Dennis Lamb’s request for a four-year lead time. (CX 39 at 004 (“[t]his four year period would allow for use of the model as a capital planning tool,” and that ... this would allow “48 months for planning, procurement, and construction.”); CX 10 at 041 (September 1992 comments that “industry planning must begin immediately.”)).
2167. WSPA during the Board’s deliberations also had submitted comments to CARB stating that “[s]ince a minimum of four years lead time is required to plan and bring refinery facilities on-stream, the regulations should not take effect less than four years after all compliance options, including the predictive model, are finalized.” (CX 10 at 171).

## **XVI. Unocal Continued to Conceal Its Plan to Enforce Proprietary Rights Related to Its 5/14 Research After the November 21-22, 1991 CARB Board Hearing.**

### **A. Unocal Took Actions Following the CARB Board Hearing That Reflected Its**

## **Intent to Capture the Phase 2 RFG Regulations.**

### **1. In the Fall of 1991, CARB's adoption of Phase 2 specifications Increased the Importance of the Pending Patent Application Because it Seemed Likely that Refiners Would Make Fuel Covered by Unocal's Pending Patent Claims.**

2168. As of May, 1991, Mr. Wirzbicki had not heard anything back from the Patent Office concerning the patent application. (Wirzbicki, Tr. 939-940).
2169. During the period from May 23, 1991 to November 19, 1991, there were no changes in the status of Unocal's patent application. (CX 1788 at 209-231). Mr. Wirzbicki did not make any filings, and the Patent Office did not issue any actions. (CX 1788 at 209-231).
2170. Even through the December of 1991, the claims in the '393 patent were the same ones that had last been changed in May 1991. (Wirzbicki, Tr. 964).
2171. What Mr. Wirzbicki knew in the spring of 1991 and what Unocal knew, to Mr. Wirzbicki's knowledge, was that it had a patent application with claims that were amended one time. (Wirzbicki, Tr. 940-941).
2172. During the period from May 23, 1991 to November 19, 1991, Drs. Jessup and Croudace knew of the contents of the Unocal patent application. Drs. Jessup and Croudace knew the contents of the patent application as of May 22, 1991, and there were no changes to the application between May 23, 1991 to November 19, 1991. (CX 1788 at 189-201; CX 1788 at 203-207; CX 1788 at 209-231).
2173. After CARB's decision to regulate certain gasoline properties, and its corresponding adoption of averaging, flat, and cap limits in November 1991, Unocal amended its patent application accordingly. (CX 1788 at 245-283; Wirzbicki, Tr. 970-971). On March 10, 1992, Unocal made a major amendment to its patent application. Numerous claims were amended to correspond to the limits and values specified in the CARB Phase 2 regulations. (CX 1788 at 253, 255, 261, 331).
2174. By late 1991 or January 1992, Mr. Wirzbicki, Unocal's Chief Patent Counsel, learned of the CARB Phase 2 regulations. (Wirzbicki, Tr. 956). Mr. Wirzbicki saw an article describing the CARB Phase 2 regulations shortly after they became public. (Wirzbicki, Tr. 956, 958-960; CX 1788 at 327, 329-331).
2175. In late 1991 to early 1992, Mr. Wirzbicki also knew of the limits CARB had proposed for RVP, aromatics, T90, T50, olefins, and other properties of gasoline. (CX 1788 at 331; Wirzbicki, Tr. 957-960).
2176. When Mr. Wirzbicki became aware of the CARB specifications in the Fall 1991 time

frame, Mr. Wirzbicki believed that “litigation was a lot more likely over what became the ‘393 patent.” (Wirzbicki, Tr. 970).

2177. Mr. Wirzbicki believed in the Fall 1991 time frame that litigation was more likely over what became the ‘393 patent because “at that point in time, it seemed likely that some refiners would make the kind of fuel that [he] knew [Unocal] had claims that covered.” (Wirzbicki, Tr. 970).
2178. CARB’s Phase 2 regulations in the late 1991 time frame also “increased the importance” in the mind of Unocal’s Chief Patent Counsel, Mr. Wirzbicki, of the “subject matter of the pending patent application.” (Wirzbicki, Tr. 969).
2179. One of the reasons that CARB’s Phase 2 regulations increased the importance of the pending patent application in Mr. Wirzbicki’s mind was that “some of the CARB specifications were pointing directionally, if not completely, towards some of the fuels that Unocal was claiming.” (Wirzbicki, Tr. 969-970).
2180. In the fall of 1991, when Mr. Wirzbicki became aware of the CARB regulations, Mr. Wirzbicki considered it “in Unocal’s interest to get claims that cover[ed] the CARB Phase 2 specifications.” (Wirzbicki, Tr. 969).
2181. By late 1991 to January 1992, Mr. Wirzbicki understood that CARB proposed to regulate four of the eight gasoline properties covered by Unocal’s then pending patent claims: T50, T90, olefins, and RVP. (Wirzbicki, Tr. 957-958).
2182. The specification of Unocal’s patent application also covered another property that CARB regulated, aromatics. (CX 1788 at 331 (summary of CARB regulation); CX 1788 at 16 (patent specification). Although Unocal’s patent application in late 1991 to early 1992 did not contain claims to aromatics, it had claims to olefins and paraffins – which, together with aromatics, must add up to 100 percent. (Wirzbicki, Tr. 961-964; CX 1788 at 190).

**2. In March 1992, Unocal Amended Its ‘393 Patent Application to Create Greater Overlap with CARB’s Phase 2 RFG Specifications.**

2183. In the fall of 1991, when Mr. Wirzbicki became aware of the CARB regulations, Mr. Wirzbicki considered it “in Unocal’s interest to get claims that cover[ed] the CARB Phase 2 specifications.” (Wirzbicki, Tr. 969).
2184. On March 10, 1992, after learning of the CARB Phase 2 regulations, Mr. Wirzbicki filed a set of documents with the Patent Office related to the application that lead to the ‘393 patent:
  - a. An “Amendment” (CX 1788 at 245-283; Wirzbicki, Tr. 970-971);

- b. Information Disclosure Statement (“IDS”) No. 10 relating to the CARB Phase 2 regulations (CX 1788 at 327-332);
- c. various additional IDS’s (Nos. 7-9 and 11), (CX 1788 at 285-325, 334-337), and a new set of the drawings on the correct size of paper (CX 1788 at 233-243; 231).

2185. In the “Amendment” filed March 10, 1992, Mr. Wirzbicki added new claims (125-194), deleted a series of claims (including the method claims), and amended the remaining claims. (CX 1788 at 268, 245-283; Wirzbicki, Tr. 970-972). Mr. Wirzbicki made a number of arguments explaining why the claims were patentable. (CX 1788 at 275-278).

2186. Mr. Wirzbicki included a table in March 10, 1992 Amendment explaining the pending independent claims. The table is reproduced in part as follows:

Claim _____	RVP <u>psi</u>	T50 <u>°F.</u>	Olefins <u>Vol.%</u>	Paraffins <u>Vol.%</u>	Other _____
...					
56	≤7.5	≤210	≤6		
...					
90	<7.0	≤210			
...					
127	≤7.0	≤215	<8		

(CX 1788 at 269; Wirzbicki, Tr. 971-972).

2187. As the table shows, a number of the amended claims pending in Unocal’s patent application in March 1992 – such as claims 56, 90 and 127 – covered essentially all gasoline made in accordance with the CARB Phase 2 flat limit specifications. (CX 1788 at 269 (table); CX 1788 at 253, 255, 261 (claims); CX 1788 at 331 (CARB specifications). The CARB flat limits specified an RVP of no greater than 7.0 psi, a T50 no greater than 210 °F. , and olefins no greater than 6% volume. (CX 1788 at 331).

2188. The same claims pending in Unocal’s patent application in March 1992 – for example, 56, 90 and 127 -- also covered a great deal of the gasoline made in accordance with the CARB Phase 2 cap limits. (CX 1788 at 269 (table); CX 1788 at 253, 255, 261 (claims); CX 1788 at 331 (CARB specifications)).

2189. Mr. Wirzbicki knew when he saw the CARB regulations in late 1991 to early 1992 that some, if not all, of the fuels that would be made to comply with the regulations “would fall within some of the claims that [he] already had in the pending patent.” (Wirzbicki,

Tr. 956-957, 967-968).

2190. For example, Unocal's Claim 90 pending in early 1991 to late 1992 claimed: "An unleaded gasoline fuel suitable for combustion in an automotive engine, said fuel having a Reid Vapor pressure no greater than 7.5 psi, and a 50% D-86 distillation point no greater than 210° F." (CX 1788 at 191).
2191. CARB's Phase 2 flat limits required an RVP of no greater than 7.0 psi and a T50 of no greater than 210°. (CX 1788 at 331; Wirzbicki, Tr. 964-966).
2192. Claim 90 thus covered all gasoline made in accordance with CARB's flat limits. (CX 1788 at 331; Wirzbicki, Tr. 964-966).
2193. Unocal's Chief Patent Counsel, Mr. Wirzbicki admitted that "whatever fuel is produced under the CARB regulation" – provided that it meets the regulation's flat limits of T50 no greater than 210°F and RVP no greater than 7.0 psi – "would fall within claim 90." (Wirzbicki, Tr. 965-966).
2194. Claim 90 also covered much of the gasoline made in accordance with CARB's cap limits: T50 of no greater than 220° and RVP of no greater than 7.0 psi. (CX 1788 at 331).
2195. Claim 1 thus covered all gasoline made in accordance with CARB's flat limits: T50 of no greater than 210° and RVP of no greater than 7.0 psi. (CX 1788 at 331; Wirzbicki, Tr. 966-968). Claim 1 also covered much of the gasoline made in accordance with CARB's cap limits: T50 of no greater than 220° and RVP of no greater than 7.0 psi. (CX 1788 at 331).
2196. Mr. Wirzbicki, Unocal's Chief Patent Counsel, agreed that "these two claims [1 and 90] obviously would cover the flat limits" of the CARB Phase 2 regulations. (Wirzbicki, Tr. 968; context at 964-968).
2197. Along with the Amendment, Mr. Wirzbicki on March 10, 1992 also provided the Patent Office with IDS No. 10, enclosing an article he had reviewed concerning the CARB Phase 2 regulations. (CX 1788 at 327-332; Wirzbicki, Tr. 958-960, 972). The article was entitled, "California Sets Tough Auto Standards", and was published in Nov./Dec. 1991 by Jan Sharpless, the chairperson of CARB. (CX 1788 at 329-331 (CARB article); Wirzbicki, Tr. 958-960, 972). Dr. Croudace supplied the article to Mr. Wirzbicki. (Wirzbicki, Tr. 972, 959-60).
2198. Indeed, Mr. Wirzbicki believed in March 1992 "that CARB regulation showed the commercial success of the invention." (Wirzbicki, Tr. 976, 978-979).
2199. Mr. Wirzbicki also provided the patent examiner with the article describing the CARB Phase 2 regulations in March 1992 because it "validated the fact that properties of

gasoline could affect emissions” in “more or less the same way” that his “inventors had found.” (Wirzbicki, Tr. 975, 972-973, 959-960; CX 1788 at 326-332). More specifically, Mr. Wirzbicki believed “that the CARB specifications . . . validated the invention.” (Wirzbicki, Tr. 976).

2200. Mr. Wirzbicki continues to believe that the CARB Phase 2 regulations validated Dr. Jessup and Dr. Croudace’s invention. (Wirzbicki, Tr. 976).
2201. Unocal’s Chief Patent Counsel understood in March 1992 that to the extent the CARB regulations validated what his inventors had achieved, “it could help show that the patent claims were nonobvious.” (Wirzbicki, Tr. 976). Mr. Wirzbicki knew that the nonobviousness of a claimed invention is one of the conditions of patentability. (Wirzbicki, Tr. 976-977).
2202. Mr. Wirzbicki provided the article describing the CARB Phase 2 regulations to the patent examiner in March 1992 to allow the patent examiner to decide whether the claims pending in Unocal’s patent application were non-obvious. (Wirzbicki, Tr. 976).
2203. If the CARB Phase 2 specifications did not substantially overlap with Unocal’s pending patent claims, then they would not have “validated” or shown the “commercial success” of the claimed invention in Unocal’s pending patent application. (*See, e.g.*, CX 1788 at 327; Wirzbicki, Tr. 976, 978-979).
2204. The Nov./Dec. 1991 CARB article that Mr. Wirzbicki sent to the patent examiner included a table showing the CARB Phase 2 regulatory specifications for low emissions gasoline, including the flat limits, averaging standard limits, and cap limits for RVP, aromatics, T90, T50, oxygen, olefins, benzene and sulfur:

Fuel Property	Conventional gasoline	Phase 1	Phase 2 Flat limit for producers	Phase 2 Standard for averaging	Phase 2 Cap for all gasoline
Sulfur, wt ppm	150	--	40	30	[30]
Benzene, vol%	2.0	--	1.0	0.8	1.2

Olefins, vol%	9.9	--	6.0	4.0	10.0
Oxygen, vol%	0	--	1.[8]-2.2	--	2.7 (max) 1.[8] (min)
T <sub>90</sub> °F	330	--	300	290	330
T <sub>50</sub> °F	220	--	210	--	220
Aromatics, vol%	32	--	25	22	30
Rvp, psi	8.5	7.8	7.0	--	7.0

(CX 1788 at 331; Wirzbicki, Tr. 958-960) (footnotes in table omitted).

2205. Mr. Wirzbicki specifically asked the patent examiner to “review the specifications set forth . . . [in the table in the Nov./Dec. 1991 CARB article] for gasolines to be sold in the future in California” and to “compare [them] to the claimed invention, in particular, the requirements for T50, T90, RVP, and olefin content.” (CX 1788 at 327).
2206. By comparing the specifications in the Nov./Dec. 1991 CARB article with the claimed invention, one could see that a number of the new and existing claims in the patent application in March 1992 covered gasoline that would be made under the CARB Phase 2 regulations. (CX 1788 at 331, CARB specifications, vs., *e.g.*, CX 1788 at 253, 255, 260-61, 255, claims 56, 90, 125, 127, 128).
2207. For example, in addition to the independent claims 56, 90, and 127 discussed above, Mr. Wirzbicki added various dependent claims, such as claim 125, “An unleaded gasoline fuel as defined in claim 90 having an olefin content less than 10 volume percent.” (CX 1788 at 260). Claim 125 incorporated Claim 90, which claimed, “An unleaded gasoline fuel suitable for combustion in an automotive engine, said fuel having a Reid Vapor pressure of less than 7.0 psi, and a 50% D-86 distillation point no greater than 210° F.” (CX 1788 at 255). Claim 125 thus also would cover essentially all of the gasolines made in compliance with the CARB Phase 2 flat limits, and a great deal of the gasoline made under the cap limits. (CX 1788 at 255, 260 (claims); CX 1788 at 331 (CARB specifications); Wirzbicki, Tr. 973-975).
2208. Mr. Wirzbicki explained to the patent examiner that the Nov./Dec. 1991 CARB article was not prior art to the patent application, because the CARB specifications “came after the invention.” (Wirzbicki, Tr. 973; CX 1788 at 327).
2209. Mr. Wirzbicki, Unocal’s chief patent counsel, submitted an Information Disclosure Statement (“IDS”) (No. 10) to the patent examiner at the same time as the March 10,

- 1992 amendment. This IDS included an article by Jananne Sharpless, the CARB's Chairperson, detailing the CARB Phase 2 regulations. The submission reveals that Wirzbicki knew of the Phase 2 regulations and their importance to Unocal's patent application. (Wirzbicki, Tr. 956, 958-960, 969; CX 1788 at 327, 329-331).
2210. There were no changes in the application that lead to the '393 patent in the period from June through August 1992. (Wirzbicki, Tr. 952-953).
2211. On June 22, 1992, Mr. Wirzbicki received an office action from the patent examiner dated June 16, 1992. (CX 1788 at 339-353). Between the office action and Mr. Wirzbicki's March 20, 1992 amendment, there were no changes to Unocal's pending patent application. (CX 1788 at 245-353).
2212. Mr. Wirzbicki telephoned the patent examiner, Helane Myers on June 29, 1992 to clarify the status of the office action. (Wirzbicki, Tr. 982; CX 1788 at 363-364).
2213. After receiving the July 1992 office action allowing patent claims, Mr. Wirzbicki could have cancelled the remaining rejected claims in the patent application. Had he done so, he would have likely obtained an issued patent sooner than he did. (Linck, Tr. 7760-7761).
2214. Instead, Mr. Wirzbicki chose to continue prosecution, which had the effect of continuing to maintaining the confidentiality of the application at the PTO. (Linck, Tr. 7760-7761; CX 1788 at 361-385).
2215. Mr. Wirzbicki filed various information disclosure statements with the patent examiner in the latter half of 1992. (CX 1788 at 361 (IDS No. 12), CX 1788 at 366-368 (IDS. No. 13)). He also filed an amendment on December 16, 1992 adding 8 claims, cancelling 15, and amending 2 claims. (CX 1788 at 370-385).
2216. Among the claims Mr. Wirzbicki added in December 1992 were some with numerical values that had not been explicitly disclosed in the specification of the patent application, *e.g.* an RVP of 6.8 psi. (CX 1788 at 373).
2217. Mr. Wirzbicki understood, and explained to the patent examiner in December 1992, that even though specific numerical value of the claims were not explicitly disclosed in the original patent application, the directional relationships taught in the specification of the application "reasonably convey to one skilled in the art that the inventors had possession of the claimed subject matter." (CX 1788 at 373).
2218. In response to Mr. Wirzbicki's December 1992 filing, the patent examiner on March 24, 1993 sent Unocal a notice of allowability for the entire application, including all of the remaining pending claims. (CX 1788 at 387).

2219. Following the March 1993 notice of allowability, Mr. Wirzbicki only made minor format corrections (CX 1788 at 389-390, 397-416), filed an IDS (CX 1788 at 392-396), and cancelled two claims (CX 1788 at 418-419) – as recognized by the patent examiner on June 3, 1993 and entered (CX 1788 at 421-422, 428, 430, 434-437).

**3. By the Summer of 1992, the Highest Levels of Management at Unocal Knew That Unocal’s Patent Would Likely Be Granted, and That It Would Cover Most, if Not All, of CARB Phase 2 Reformulated Gasoline.**

2220. The patent examiner told Mr. Wirzbicki on June 29, 1992, that “most of the claims of the ‘393 patent were going to be allowed.” (Wirzbicki, Tr. 942; CX 1788 at 363-364).

2221. The patent examiner also agreed to send Mr. Wirzbicki a replacement office action confirming their conversation. (CX 1788 at 364). The July 1, 1992 office action from the patent examiner allowed approximately 147 claims in the application that lead to the ‘393 patent, and only rejected 13 claims. (CX 1788 at 355-357).

2222. Following Mr. Wirzbicki’s June 1992 conversation with the patent examiner, he “believed that [he was] . . . going to get claims issued and allowed in the ‘393 patent.” (Wirzbicki, Tr. 983).

2223. Mr. Wirzbicki knew that it would be “highly unlikely” for the examiner to withdraw the office action allowance. (Wirzbicki, Tr. 983). Mr. Wirzbicki understood that it is “rare” for examiners to go back on what they have already allowed. (Wirzbicki, Tr. 983).

2224. Both Mr. Wirzbicki and the patent examiner summarized their June 29, 1992 conversations for the record in the patent file. (Wirzbicki, Tr. 982-983; CX 1788 at 359; CX 1788 at 363-364).

2225. As Mr. Wirzbicki and the patent examiner had discussed, the patent examiner mailed a clarification office action on July 1, 1992. (CX 1788 at 355; CX 1788 at 364).

2226. Among the claims allowed by the July 1, 1992 office action were claims 56, 90, 125, and 127. (CX 1788 at 355, 357).

2227. These claims allowed by the July 1, 1992 office action, among others, completely covered the CARB Phase 2 proposed flat limits. (CX 1788 at 355-357 (office action allowing claims); CX 1788 at 253, 255, 261 (claims); CX 1788 at 331 (CARB specifications); Wirzbicki, Tr. 983-984).

2228. In the “summer of 1992,” after Mr. Wirzbicki had heard from the patent examiner, Mr. Wirzbicki “discuss[ed] the allowance of some of the claims in the ‘393 patent with Unocal management.” (Wirzbicki, Tr. 943).

2229. The first person in Unocal management that Mr. Wirzbicki notified of the allowance of the patent claims was Dr. Wayne Miller and this was at the end of June 1992. (Wirzbicki, Tr. 942-944).
2230. Mr. Wirzbicki then called Unocal's general counsel, Mr. Snyder, in the summer of 1992 to notify him of the allowance of the claims in the patent application that lead to the '393 patent. (Wirzbicki, Tr. 943-944).
2231. Mr. Wirzbicki also met in the summer of 1992 with Dr. Wayne Miller, and Dr. Miller's supervisor, Don D'Zurilla, to discuss the allowance of claims in the patent application that lead to the '393 patent. (Wirzbicki, Tr. 943-944).
2232. Mr. Wirzbicki also informed Mr. Steve Lipman, the President of Unocal's Science and Technology Division, about the fact that the Patent Office allowed most of the claims of the '393 patent. (Wirzbicki, Tr. 945-946; CX 591 at 001). (CX 7053 (Lipman, Dep. at 4-9); CX 593 at 003).
2233. On August 3, 1992, Mr. Lipman sent a monthly update report to Mr. Roger Beach, who was then Unocal's President and Chief Operating Officer, stating that:
- Unocal received an informal notice from the U.S. Patent and Trademark Office that it would allow claims to Unocal's reformulated gasoline. **These claims are broad enough to cover all gasoline fuels to be sold in California under current CARB regulations starting in March 1996.**
- (CX 593 at 003) (emphasis added).
2234. By August of 1992, Unocal senior management therefore knew that patent claims were allowed that covered all gasoline fuels that could be sold under the CARB regulations. (CX 593 at 003).
2235. In August or September 1992, Mr. Wirzbicki also met with Roger Beach, Unocal's then-Chief Operating Officer, and told him that the "Patent Office allowed most of the claims "of what became the '393 patent." (Wirzbicki, Tr. 945-946).
2236. After Mr. Wirzbicki told Unocal management about the allowed claims in 1992, Mr. Richard Stegemeier, Unocal's then-Chief Executive Officer, personally called Mr. Wirzbicki to "congratulate" him "for the allowance." Mr. Wirzbicki did not "get calls like that from the CEO all the time." "It's like getting a call from the Pope." (Wirzbicki, Tr. 946).
2237. At the time he received the call from Mr. Stegemeier, Mr. Wirzbicki knew that Mr. Stegemeier was "as high up a guy in [his] organization as [he] knew." (Wirzbicki, Tr.

947). In addition, according to Mr. Wirzbicki, Mr. Stegemeier was a “science wonk.” (Wirzbicki, Tr. 946-947).

2238. Following the successful completion of the first set of patent litigation related to the ‘393 patent, {

} (Wirzbicki, Tr. 1067-

1068, *in camera*; CX 712, *in camera*).

2239. {

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(CX 712, *in camera*; Wirzbicki, Tr. 1067-1068, *in camera*).

2240. Mr. Wirzbicki, Unocal’s Chief Patent Counsel, was {

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} (Wirzbicki, Tr. 1068-1069, *in camera*).

**4. In the Summer of 1992, Unocal Hired Outside Counsel and Planned for Litigation to Enforce and Obtain Royalties On What Became the ‘393 Patent.**

2241. At about the time that Mr. Wirzbicki received notice that “most of the claims of the ‘393 application would be allowed,” Unocal began to prepare for possible litigation over what became the ‘393 patent. (Wirzbicki, Tr. 947-949).

2242. In August 1992, Unocal engaged two outside counsel for preparation to litigation related to what became the ‘393 patent. Mr. Wirzbicki, Unocal’s Chief Patent Counsel, worked with the two outside counsel in “preparation for litigation” in anticipation of the issuance of the ‘393 patent. (Wirzbicki, Tr. 949-950).

2243. The outside counsel Unocal retained in 1992 were Lawrence Pretty of Pretty & Schroeder, and Alan Grimaldi of Howrey & Simon. (Wirzbicki, Tr. 949-950).

2244. Mr. Wirzbicki in 1993 sent a copy of the CARB reformulated gasoline regulations to Mr.

Pretty, one of the outside patent counsel Unocal retained in preparation for litigation over what became the '393 patent. (CX 332; Wirzbicki, Tr. 947-951). In his letter, Mr. Wirzbicki asked Mr. Pretty to call him to discuss the CARB regulations. (CX 332).

2245. Between the years of 1992 to 1995, Roger Beach was “the ultimate person who would decide the appropriate royalty rate for the '393 patent.” (Wirzbicki, Tr. 989).

**5. The Phase 2 Reformulated Gasoline Mandatory Specifications Were Not Approved by the Executive Officer of CARB for Forwarding to the Office of Administrative Law Until September 1992.**

2246. Unocal learned in July 1992 that the U.S. PTO was likely to approve most of its patent claims and that approved claims were likely to encompass many of the fuels that refiners could manufacture and still comply with the Phase 2 rule. (CCPF ¶¶ 2220-2237).

2247. CARB, at the time Unocal learned that PTO was likely to approve claims overlapping with the Phase 2 rule, still had not finally “adopted” the regulation. The Board, as part of its approval of the Phase 2 specifications in November 1991, had delegated final adoption authority to Executive Officer Boyd. (CX 817 at 008 (Board Resolution); CX 816 (Executive Order adopting Phase 2 mandatory specifications)).

2248. Executive Officer Boyd did not adopt the Phase 2 rules as written until September 18, 1992. (CX 816 at 002 (Executive Order)).

2249. After adoption, there was a further step before the CARB rules constituted a final action of the agency. The California APA required CARB to forward the proposed Phase 2 rule to the Office of Administrative Law (“OAL”). OAL was authorized to block the issuance of the Phase 2 rule if the rulemaking record lacked “substantial evidence.” (CX 7029 (Cal. Gov’t Code § 11349.1 (1991); Cal. Gov’t Code § 11349(a) (1991))).

2250. OAL approved the Phase 2 rules as written on November 16, 1992. (CX 1811).

2251. At this “adoption” phase the Executive Officer had authority of the Board to adopt or not adopt the rule based on comments received and other considerations. (Boyd, Tr. 6724-6727, 6729; Kenny, Tr. 6535).

2252. Unocal never told CARB that it had learned from the U.S. PTO that PTO was likely to approve patent claims that substantially overlapped with Phase 2 formulation. (Boyd, Tr. 6728 - 6729).

2253. CARB’s Executive Officer Boyd, if knowing of an intent by Unocal to charge money for the use of its 5/14 research, “would not have approved the regulation.” (Boyd, Tr. 6728).

2254. CARB’s General Counsel also had authority to sign off on whether CARB Phase 2 met

legal requirements and could be sent to OAL for approval. (Kenny, Tr. 6525-6527). General Counsel Kenny reviewed the proposed Phase 2 documents after the November 1991 Board hearings. (Kenny, Tr. 6497).

2255. Michael Kenny as General Counsel of CARB had the authority to withhold necessary approval to forward the Phase 2 adopted regulations to the Office of Administrative Law, if the regulation failed to meet legal requirements, including “substantial evidence” to meet statutory criteria related to effect on the economy of the state and cost effectiveness. (Kenny, Tr. 6526-6527).
2256. General Counsel Kenny did not know of the Unocal pending patent or any Unocal plan to charge royalties in connection with Phase 2 when he determined that the Phase 2 regulations met statutory requirements. (Kenny, Tr. 6541-6542).
2257. CARB’s General Counsel, Michael Kenny, “would not have signed off” on the Phase 2 regulation as written at the 1992 adoption phase, had he known about a plan by Unocal to charge money for its intellectual property rights relating to Phase 2. (Kenny, Tr. 6544).

**B. Unocal Continued to Conceal the Pending Patent in 1991-94, While Posturing as a Champion of Low Cost and Competitive Equity.**

2258. With the authority from Unocal to do so, Mr. Kulakowski sent a copy of the SAE paper to Dean Simeroth at CARB on February 10, 1992. (Kulakowski, Tr. 4446-4447; CX 1424).
2259. CARB invited the public to participate in a March 5, 1992 public workshop to discuss issues related to the Phase 2 regulations and the predictive model. (CX 984; CX 984A; CX 984B; CX 984C; Curtis, Tr. 5779-5780).
2260. Unocal in May 1992 opposed an independent refiners’ exemption on the grounds that it would cause “market disruptions, interfere with refiners’ capital recovery, and would benefit companies that were as big or bigger than Unocal. (CX 311 at 001-002).
2261. Unocal in a June 19, 1992 comment argued that CARB should delay the rulemaking because Unocal could then use the predictive model and “save Unocal at least \$10 million in capital investment” (amounting to a fraction of a cent). (CX 39 at 004). Unocal also opposed a small refiner exemption on the ground that an added cost of 6 cents per gallon would result in an unjustified “economic windfall” and “hamper capital recovery” by competing refiners (CX 39 at 002-003). Unocal stated that the 6 cents per gallon would have “a significant impact on the cost effectiveness of Phase 2 gasoline” and that “Unocal is strongly opposed to differential treatment for any segment of the refining industry.” (CX 39 at 001, 003).
2262. CARB held a hearing on certification fuels for LEV vehicles in August 1992. Unocal

representative Michael Kulakowski presented written and oral testimony on behalf of Unocal at the CARB hearing on August 14, 1992. (CX 40 (Partial Transcript of CARB Hearing Re: New Specifications for Gasoline Certification Fuel, Aug. 14, 1992)). At this hearing, Kulakowski reiterated Unocal's position that CARB should be committed to a "level playing field." (CX 40 at 006). He stated that "Unocal wants to believe that the terms 'fuel neutral' and 'level playing field' are more than just buzzwords and requests that the Board only approve certification specifications that completely support these concepts." (CX 40 at 006).

2263. Mr. Kulakowski's testimony at the August 14, 1992 LEV hearing also reiterated the Unocal position that its potential cost savings of \$10 million annually should be material in CARB's decision making. (CX 40 at 008).
2264. On September 4, 1992, Unocal submitted comments to CARB concerning the proposed Phase 2 RFG regulations. Unocal submitted these comments in the form of a letter signed by Unocal's CEO Richard Stegemeier. (CX 42 (Unocal Comments on the Proposed Revisions to the CARB Phase 2 Gas Regulations, Sept. 4, 1992)).
2265. In its September 1992 comments, Unocal did not inform CARB that in June 1992 the PTO had notified Unocal that most of its pending patent claims had been allowed. (CX 42).
2266. In its September 1992 comments, Unocal did not inform CARB that Unocal had determined that its allowed patent claims were "broad enough to cover all gasoline fuels to be sold in California under current CARB regulations starting in March 1996." (CX 42; CX 593 (Unocal memorandum, Stephen C. Lipman to Roger Beach, August 3, 1992)).
2267. On November 10, 1992, Mr. Lamb submitted comments to CARB on behalf of Unocal. In these comments, Unocal stated it was strongly opposed and took strong exception to "exemptions for any class of the regulated industry." (CX 391 at 003; Lamb, Tr. 2095).
2268. On January 3, 1993, Unocal submitted comments to CARB that went out on Mr. Lamb's letterhead. These comments were approved by Mr. Lamb, but the letter was signed by David Light. (CX 318; Lamb, Tr. 2096).
2269. On June 22, 1993, senior manager Neil Schmale submitted a letter on behalf of Unocal to Mr. Boyd. (CX 1403; Lamb, Tr. 2096-2097). Mr. Lamb had a hand in drafting and preparing this letter for submission to CARB. (Lamb, Tr. 2097).
2270. On April 7, 1994, Mr. Lamb sent a letter to CARB addressed to James Boyd submitting Unocal's comments concerning CARB's Phase 2 regulations and the promulgation of CARB's predictive model. (CX 393).

2271. In the April 7, 1994 Unocal comments to CARB, Mr. Lamb indicated on behalf of Unocal, that Unocal was pleased with the development of CARB's predictive model. (CX 393 at 003).
2272. On April 19, 1994, senior manager Neil Schmale submitted comments on behalf of Unocal to CARB. Mr. Lamb was copied on this letter. (CX 344; Lamb, Tr. 2100).
2273. During the CARB Phase 2 rulemaking, Unocal submitted comments to CARB that reflected Unocal's belief that CARB should be concerned about cheating. On June 3, 1994, Unocal submitted comments to CARB in which it expressed concern that there were safeguards to ensure that cheating was controlled. (CX 43 at 011; Lamb, Tr. 2101).
2274. On June 4, 1994, Unocal submitted comments that stated its concerns about downstream cheating. (CX 44 at 005; Lamb, Tr. 2099). In June 1994, Mr. Lamb believed that CARB should be made aware of the potential possibilities of others taking advantage of the regulations, and that CARB should be concerned about stopping cheating or people taking undue advantage of the regulations. (Lamb, Tr. 2100).

## **XVII. Unocal Never Told CARB That Unocal Intended to Seek and Enforce A Patent on the CARB Predictive Model.**

### **A. CARB Staff Engaged in a Detailed Statistical Analysis of Emissions Properties.**

2275. In the context of Phase 2, CARB defined a predictive model generally as a set of mathematical equations that allows one to estimate the change in emission from motor vehicles that will occur when one or more selected fuel properties are changed. A predictive model is typically used to compare the emissions associated with the use of one gasoline versus another gasoline. (CX 53 at 028).
2276. After the CARB Board hearing in November 1991, CARB began an extensive effort to consolidate a master database of the available data from the studies that had attempted to evaluate the effects of fuel property changes on emissions. CARB staff also began investigating various statistical approaches. Meanwhile, the refiners also began an independent effort at developing a predictive model. (CX 53 at 029).
2277. In February 1992, CARB staff met with the refiners to discuss, among other things, the studies and available data, the appropriate statistical approaches, and the variables to be

- included in the model. WSPA formed a working group that met periodically with CARB staff. In March 1992, a public workshop was conducted. (CX 53 at 029).
2278. The initial version of the model was developed under contract to CARB by Dr. David Rocke of the University of California, Davis. The first version of the California predictive model was released in November 1992 and discussed at a December 1992 workshop. (CX 53 at 029).
2279. After refiners expressed concerns about certain anomalies in the data, CARB staff conducted an in-depth review of the database and excluded some data for fuels with either a high oxygen content or an RVP greater than 10 psi. A second set of models was generated using this new database. (CX 53 at 029).
2280. CARB invited the public to participate in a February 9, 1994 public workshop related to the development of the predictive models. (CX 1000; CX 1000A; CX 1000B; CX 1000C; CX 1000D; CX 1000E; CX 1000F; CX 1000G; CX 1000H; Curtis, Tr. 5780-5781).
2281. Refiners expressed concern over some further anomalies in the second set of models, and CARB staff agreed with refiners to include the results of several newly released Auto/Oil Air Quality Improvement Research Program studies on the effects of sulfur and T90 on vehicle emissions. In January 1994, CARB staff completed the results of this modeling effort and discussed them at a February 1994 workshop. (CX 53 at 029-030).
2282. CARB approved the Predictive Model amendments to the Phase 2 regulations on June 9, 1994. (CX 53 at 005). CARB prepared a Final Statement of Reasons in April 1995 explaining the amendments, subsequent modifications, and responses to public comment. (CX 53).
2283. Each mathematical equation applies to a different indicator of air pollution. For example, a mathematical equation could be developed for an air pollutant such as hydrocarbons; or a mathematical equation could be developed for a calculated effect such as the ozone-forming potential of the hydrocarbon emissions. The ozone-forming potential is a measure of the rate at which the emitted hydrocarbons form ozone under specified conditions. (CX 53 at 028).
2284. CARB developed three mathematical equations, collectively referred to as the California predictive model. One equation determined the change in emissions of hydrocarbons, the second determined the change in exhaust emissions of oxides of nitrogen, and the third determined the change in the combined exhaust emissions of four toxic air contaminants (benzene, 1,3-butadiene, acetaldehyde, and formaldehyde.) (CX 53 at 028).
2285. The California predictive model was to be used to determine if an alternative Phase 2 RFG formulation would provide the same emissions benefits as a fuel meeting the Phase

2 RFG specifications. (CX 53 at 028).

2286. In specifying an alternative Phase 2 RFG formulation, a producer could elect to change the specifications of any or all of the Phase 2 RFG properties except for the RVP. For each select property, the producer could choose to use either the flat limit or the averaging limit. The producer could not use any value exceeding a cap limit. (CX 53 at 028).
2287. The value selected for each alternative Phase 2 RFG property would be entered in each equation with the corresponding value of the Phase 2 RFG property. An acceptable Phase 2 RFG formulation would have to provide equivalent or greater benefits in hydrocarbons, oxides of nitrogen, and potency-weighted toxic air contaminants. (CX 53 at 028).

**B. Unocal Played A Major Role In the Development of the Predictive Model.**

2288. Michael Kulakowski chaired the WSPA predictive model policy group and attended many of the meetings of the predictive model technical group. (Kulakowski, Tr. 4532-4533).
2289. Unocal played a key role in developing the WSPA Proposed Predictive Model that was submitted to CARB. (CCPF ¶¶ 1889-1898, 2290-2296).
2290. With the authority from Unocal to do so, Michael Kulakowski on February 10, 1992 sent a copy of the SAE paper regarding Unocal's 5/14 research to Dean Simeroth at CARB. (CX 1424 (Kulakowski to Simeroth note with attached "5/14" SAE paper (Feb. 10, 1992))).
2291. Unocal in a letter to CARB in April 1994 affirmed that "[Unocal] actively participated in the rulemaking process" and has continued to work directly and through WSPA to "ensure smooth implementation of the regulation." (CX 393 at 001).
2292. Unocal in its June 3, 1994 written comments on CARB's Predictive Model stated, "We actively participated in the rule making process during the months leading to the November, 1991 passage of the rule." (CX 43 at 001).

**C. CARB's Predictive Model Necessarily Incorporated the CARB Specifications And Included Key Parameters in the Unocal Patents.**

2293. CARB in its April 1994 Report proposing the predictive model carried through with its intent to prohibit any parameter in the Predictive Model from exceeding the cap limit. (CX 53 at 012, 022, 028).
2294. CARB staff relied on Unocal's research results in developing the predictive model.

Unocal's test results became a part of CARB's predictive model database from which it developed the equations that constitute the predictive model. (CX 53 at 145-146, 150).

2295. CARB in the April 22, 1994 Staff Report cited the 1992 SAE study by Unocal's Giuseppe, Croudace, and Wusz as part of its basis for the predictive model. (CX 53 at 057, item 5).
2296. Unocal publicly touted CARB's reliance on Unocal's research in CARB's formulation of the Predictive Model. (CX 769 at 065 (Dennis Lamb testifying on June 9, 1994 that "[i]n June of 1991, we shared with staff the vehicle testing research we completed and the predictive model we developed to produce and test reformulated gasoline. That research has become the single largest independently developed body of data in CARB's predictive model. It represents almost 10 percent of the 7,700 fuel tests incorporated into the model.")).

**D. Unocal Took Efforts to Have WSPA Lend Its Credibility to Unocal's Predictive Model.**

2297. Unocal believed that working within the WSPA trade association was one of the best ways to be involved in the CARB decision making process: **"It is important that Unocal provide WSPA with our best experts in Fuel technology to assure maximum benefit from this alliance, particularly when we must challenge unreasonable fuel mandates."** (CX 137 at 002) (emphasis added).
2298. Recognizing this benefit, Unocal provided input throughout the development of the CARB Phase 2 regulations through WSPA. (CX 7046 (Grey, Dep. at 40)).
2299. In particular, Unocal deployed its resources to ensure that it could influence the WSPA-proposed predictive model. For instance, Unocal had three representatives attending the predictive model technical committee. Those representatives were patent inventors Drs. Peter Jessup and Michael Croudace, and regulatory affairs manager Michael Kulakowski. (CX 294 at 001; Kulakowski, Tr. 4536-4537).
2300. On August 15, 1991 CARB held a workshop to discuss the development of the Phase 2 regulations. At this August 15 workshop, CARB indicated that it was interested in having a predictive model workshop. (CX 266 at 004). Unocal recommended that WSPA experts develop a draft predictive model, which those experts later did. (CX 266 at 004; Kulakowski, Tr. 4532).

2301. {

} (CX 100 at 033, *in camera*). This is confirmed in correspondence between Unocal and CARB. In a letter

dated August 27, 1991, Mr. Lamb told CARB that Unocal “agreed to make the [5/14] data public if necessary in the development of a predictive model for use in the certification of reformulated gasoline. The staff has now proposed to develop such a predictive model and requested that we make the data public. Please be advised that Unocal now considers this data to be non-proprietary and available to CARB. . . .” (CX 29).

2302. {

} (CX 100 at 033, *in camera*).

2303. Other Unocal employees played key roles in the WSPA predictive model effort. Unocal’s Mr. Kulakowski was the chairman of WSPA’s predictive model policy group, while Dr. Jessup combined Unocal’s 5/14 Project data with data sets from other programs. (Kulakowski, Tr. 4532-4533, 4536-4537; CX 702 at 004). According to the WSPA predictive model working group chairman, Shell’s Dr. Charles Lieder, between late 1990 and 1993 Unocal’s Drs. Jessup and Croudace, and Messrs. Kulakowski and Lamb had “high attendance” and “high input” in the predictive model working group. (Lieder, Tr. 4680).
2304. On September 10, 1991 Unocal gave a presentation to the predictive model working group regarding its 5/14 project emissions research. (CCPF ¶¶ 1767-1797). Shortly after presenting the research in September 1991, Unocal also gave data files containing the research from Unocal’s 5/14 project to the predictive model working group. (Lieder, Tr. 4692; CX 7049 (Hochhauser, Dep. at 57); CX 271 at 002-004).
2305. Over the next year, WSPA members used Unocal’s research to help develop the WSPA-proposed predictive model. (CX 7049 (Hochhauser, Dep. at 76)).
2306. In September 1991, after presenting the Unocal research to WSPA, Dr. Jessup drafted “preliminary predictive model information” for WSPA. (CX 1669 at 001; Jessup, Tr. 1303-1304). As part of the “preliminary predictive model information” effort, Dr. Jessup wrote that “DI and distillation T50 are also highly correlated,” and he recommended using only one of those two variables: T50. (CX 1669 at 002).
2307. In September 1991, Dr. Jessup volunteered to provide a “combined data set” containing all of the data collected by or submitted to the WSPA Predictive Model Working Group. On October 4, 1991 Dr. Jessup had the combined data set in an acceptable format to present to the WSPA Predictive Model Group. (CX 1761; Lieder, Tr. 4706-4707; CX 1563 at 001).
2308. The WSPA Predictive Model Working Group arranged a meeting with CARB in October 1991 to discuss the status of the predictive model and to make a presentation to CARB. (CX 277 at 003; CX 1563 at 003). Seven people from the WSPA Predictive Model

Working Group actually attended this meeting, and three of those people were from Unocal. (CX 277 at 004).

2309. On October 25, 1991, Dr. Jessup, on behalf of WSPA, gave CARB a disk containing the WSPA combined data set. (CX 1246).
2310. The results from an October 1991 regression on the combined data set that Dr. Jessup created for the WSPA Predictive Model Working Group and submitted to CARB by combining the 5/14 Project data with other data sets were “similar to those that Unocal discovered.” (CX 300 at 001).
2311. As an internal Unocal October 1991 memorandum reveals, Unocal knew that WSPA’s predictive model efforts were headed directly into the same results that Unocal discovered (and later patented) from its 5/14 Project. (CX 300 at 001).

**E. Unocal, While Concealing its Plan to Charge Money, Postured Itself as a Champion of Low Cost and Competitive Equity in the Predictive Model Phase.**

2312. One purpose of the predictive model, in CARB staff’s view, was to lower the cost to the consumer of Phase 2 by giving refiners more flexibility in how they would meet the mandatory Phase 2 specifications. According to Peter Venturini, the predictive model “would allow individual refiners to tailor how they met the requirements of our Phase 2 regulations in a manner that was consistent with the specific configuration of any given refinery. And what that meant ultimately is that the refiners should be able to meet our requirements at less cost and provide hopefully greater supply.” (Venturini, Tr. 198-199; Fletcher, Tr. 6455-6456 (the “refiners were very much encouraging us to produce a predictive model to provide additional flexibility.”))).
2313. CARB staff sought to achieve the technical objectives by providing flexibility to allow refiners to comply with the requirements of Phase 2 regulation and minimizing their costs. (Curtis, Tr. 5726-5727).
2314. CARB put into place the Predictive Model in order to meet its technical objective to allow refiners flexibility to reduce the cost of compliance. (Curtis, Tr. 5727).
2315. One purpose of the predictive model, in CARB staff’s view, was to help ensure adequate supply of Phase 2 gasoline. According to Peter Venturini, the added flexibility “would allow individual refiners to tailor how they met the requirements of our Phase 2 regulations in a manner that was consistent with the specific configuration of any given refinery. And what that meant ultimately is that the refiners should be able to meet our requirements at less cost and provide hopefully greater supply, because we also wanted to make sure there was enough of this to supply the cars in California, and that it would result in less costs ultimately to the consumer.” (Venturini, Tr. 198-199).

2316. CARB also had made clear to the public that cost to the consumer was highly relevant in the predictive model phase of the proceeding. The goal of the predictive model was “lower the expected cost to the consumers” without sacrificing benefits. (CX 53 at 006, 053-054).
2317. One stated reason for CARB’s concern about cost and flexibility in the predictive model phase was “greater certainty that there will be no disruptions in the supply of gasoline. This should help avoid price increases due to any real or perceived fuel shortages.” (CX 53 at 019, 053).
2318. CARB in the Predictive Model phase also made clear to the public that it was concerned about a competitive level playing field. The April 22, 1994 Staff Report explained that CARB gave refiners a more lenient approach on the predictive model so that would remain “equitable” among refiners. (CX 53 at 014). The Report also devoted a separate section to “Impacts on Competitiveness” and stressed that all large refiners will be treated alike. (CX 53 at 054).
2319. Unocal expressed concern that the industry as a whole not suffer if certain predictive model aspects “severely hamper the amount of flexibility” and “adversely impact the volume and production cost of RFG.” (CX 393 at 002).
2320. Unocal at a January 5, 1994 meeting with CARB Chairman Sharpless, Executive Officer James Boyd, and other CARB staff failed to disclose that the U.S. Patent Trademark Office had notified Unocal that all of its ‘393 patent claims had been allowed. (Boyd, Tr. 6849-6850).
2321. Mr. Lamb of Unocal stated at a public meeting on June 9, 1994 that Unocal has “always been a strong advocate of a predictive model and the economic flexibility potential of that concept.” (CX 769 at 065).
2322. During CARB’s development of a predictive model, Unocal continued to argue for more flexibility to enable additional cost savings. (CX 43 (Unocal Comments on CARB’s Predictive Model and Revisions to the Phase 2 Regulations, June 3, 1994)).
2323. In comments submitted to CARB relating to CARB’s development of a predictive model, Unocal cast itself as having taken a position on the predictive model keyed to the “cost effectiveness” of the regulations. Unocal stated: “We are pleased that most of the model decisions have been based on sound science and have observed our basic criteria of necessity and cost effectiveness.” (CX 43 at 005).
2324. In his June 9, 1994 testimony before CARB, Dennis Lamb stated that Unocal “participated in the WSPA effort.” Dennis Lamb did not inform CARB that Unocal had not provided information to WSPA concerning the potential royalty costs associated with

its RFG patent rights. (CX 44 at 003).

2325. In his June 9, 1994 testimony before CARB, Dennis Lamb stated that Unocal was worried about “unscrupulous operators” who may take advantage of the regulations and “cheat.” (CX 44 at 005).

### **XVIII. Refiners Began the Efforts to Modify Their Refineries Around the Time that the Phase 2 Regulations Were Approved in November 1991.**

2326. The CARB Phase 2 regulations forced refiners to take into account and comply with specifications that California refiners had never monitored before. (Eskew, Tr. 2855).

2327. No two California refineries were exactly the same as far as processing in late 1991. Each had its own crude oil mix, processing unit capacities, operating limits, catalysts, configuration (types of units and location in the processing), and stream distillation ranges. (RX 1165A at 008-009).

2328. As a consequence of no two refineries being exactly the same, each refinery was modified differently to change to a new set of specifications for CARB Phase 2. (RX 1165A at 009).

#### **A. Refiners Began Their Phase 2 Modifications Planning Years Before the CARB’s 1996 Deadline.**

2329. All California refiners had to begin their planning early to ensure that they were able to meet the CARB Phase 2 production deadline of March 1, 1996. (CCPF ¶¶ 2326-2350).

- a. For example, ARCO began studying possible CARB Phase 2 refinery configurations for the ARCO Carson refinery no later than January 1992. (CX 5079).
- b. Chevron took five years to plan the modifications to Chevron’s California refineries to meet the CARB Phase 2 regulations. (Gyorfi, Tr. 5238). Chevron started work on its CARB Phase 2 project in the early part of 1992. (CX 5002 at 004).
- c. Planning for the Exxon Benicia modification project began in the late 1990, early 1991 time frame, as soon as the CARB rulemaking process had begun. (Eizember, Tr. 3104, 3111).
- d. Shell began planning for its modifications as early as July 1991. (CX 5100 at 004 (requesting additional funding based on original Authorization For Expenditure

approved in July 1991); RX 1154A at 023).

2330. For the CARB Phase 2 modifications, refiners generally took several steps to each project. First, refiners did screening studies to determine the scope of their RFG projects. (Eizember, Tr. 3104; Gyorfi, Tr. 5237-5238).
2331. At some California refining companies, the initial planning activities involved personnel monitoring the regulatory development to understand what the requirements would likely be. (Eizember, Tr. 3104).
2332. In order to get a jump on the planning process, some refiners performed broad studies of possible modifications, some even before the CARB Phase 2 regulations were passed. *E.g.*, (CX 5079; RX 249).
2333. At the initial planning phase, the California refiners each screened a number of options. As the requirements for the CARB Phase 2 regulations became more clear, the options were narrowed to a shorter list. This short list of CARB Phase 2 modification options was ultimately presented for final decisions by the appropriate authority. (Eizember, Tr. 3104-3105).
2334. After the options are screened, the refiners defined the modifications to be done for the project. (Eizember, Tr. 3106-3107, 3109-3110). It was necessary to have a clear understanding of what would be done so as to complete the necessary land use and air permit applications and draft Environmental Impact Reports, which were a prerequisite to obtaining permits. (Gyorfi, Tr. 5237-5238; Eizember, Tr. 3110).
2335. The next step for California refiners was filing the applications for the necessary permits to construct any needed renovations, which took a considerable amount of time. (Gyorfi, Tr. 5237-5238; Eizember, Tr. 3110).
2336. In order to complete their Phase 2 modification projects on time, California refiners had to receive the permits about two years before the start-up of the unit was required. (Sarna, Tr. 6350). The refiners generally completed their applications by late 1992 or 1993. (CX 355 at 006).
2337. By the time the permits were filed, the final cost estimates were ready to get the appropriation request approved. (Gyorfi, Tr. 5237-5238).
2338. While they were applying for permits, the California refiners continued with engineering work to prepare for the modifications. The California refiners also made arrangements for the delivery of certain complex pieces of equipment, because some equipment had very long delivery times. (Gyorfi, Tr. 5237-5238; CX 975 at 026).
2339. Finally, construction agreements were initiated and construction workers and contractors

were moved on-site at the California refineries to start construction. (Gyorfi, Tr. 5237-5238; CX 975 at 026).

2340. Denny Lamb understood during the Phase 2 RFG refinery modification process that the process of reconfiguring a refinery to produce CARB-compliant gasoline required a fairly long lead time. (Lamb, Tr. 1918-1919). Lamb also understood that one had to start almost immediately from the planning stage after the Phase 2 specifications were adopted. (Lamb, Tr. 1919). Refiners had to start the process in this way in order to start the engineering and permitting process.
2341. From Denny Lamb's experience, the permitting process in California could be difficult, "to say the least." (Lamb, Tr. 1919).
2342. Denny Lamb understood that in 1993, two years after the adoption of the Phase 2 specifications, refiners had to be committed to making the necessary modifications to their refineries, because after two years refiners would be "swimming down the hole." (Lamb, Tr. 1920).

**B. The Permit Applications Were the Key Factor in Planning Refinery Modifications to Meet the CARB Phase 2 Regulations.**

2343. The critical path activity in meeting the March 1, 1996 deadline for producing CARB Phase 2 gasoline was the environmental permit process. California refinery projects were constrained by requirements from multiple federal, state and local regulations relating to air, water, and solid waste. (Sarna, Tr. 6350; RX 1154A at 011).
2344. The primary sequence of steps involved meeting the requirements of the California Environmental Quality Act (CEQA), completing the Environmental Impact Report, and obtaining the various permits required by the local air quality management districts. (RX 1154A at 011-012).
2345. Mr. Stellman, Unocal's technical expert, testified that "As a general matter, due to the times required for the California permitting process, design, and engineering, and given that construction had to be completed by March 1, 1996 when the Phase 2 regulations went into effect, the revisions planned for a specific refinery were basically set at the time the permit applications were submitted to the state of California, generally in late 1992 and early 1993." (RX 1165A at 006; CX 355 at 006).
2346. In order to be able to complete their projects on time, refiners would have to receive permits about two years before the start-up of the unit was required. (Sarna, Tr. 6350; Hoffman, Tr. 4877-4878).
2347. Refiners recognized the importance of completing the permit process early. ARCO was

aware that it was on a very tight schedule to obtain permits needed to achieve its refinery modifications in time to meet new air quality regulations. (RX 452 at 006). “Air permit delay as a result of the Environmental Impact Report being delayed in the CEQA process is probably the greatest schedule exposure for the project.” (RX 452 at 006).

2348. Chevron believed that it was imperative for Chevron to receive its permits in a timely manner because if any permits were delayed, Chevron’s ability to produce any California Phase 2 gasoline would “be severely impacted.” (CX 1703 at 001).
2349. Exxon expected the permitting process under the California Environmental Quality Act to take 18 months from the time the application was submitted to the time it had the permits to construct. Exxon budgeted 18 months for the permit approval process. (Eizember, Tr. 3119, 3122; CX 975 at 026). It was important to Exxon to ensure that there were no substantial modifications to the scope of permitting activities. This was important because it was critical for the project to be completed on time and so that Exxon was in compliance with the regulatory requirements. (Eizember, Tr. 3121).
2350. Each of the refiners went through these processes, and ultimately the planners developed recommendations that their companies spend hundreds of millions, if not billions of dollars, in modifications. (RX 1154A at 027). Refiners as a whole spent about \$4 billion to modify their refineries to meet CARB’s Phase 2 regulations. (RX 1165A at 007).

### **C. Refinery Planners Faced Skeptical Management As They Planned Phase 2 Modifications.**

2351. As they set their modification plans, however, each of the refiners faced skeptical management. *See, e.g.* (Hoffman, Tr. 4879-4880; Gyorfi, Tr. 5212-5213; Eizember, Tr. 3153-3156).
2352. The management at the California refining companies recognized that there were “big risks” associated with modifying refineries to meet the CARB Phase 2 regulations. (Hoffman, Tr. 4879-4880).

#### **1. ARCO**

2353. At ARCO, management recognized that there were “a number of layers of uncertainty” associated with ARCO’s build-out for the CARB Phase 2 regulations at the Carson refinery. The “top business uncertainty” was the effect of the various different regulations that were affecting the site of the Carson refinery in California. (Hoffman, Tr. 4913). ARCO also recognized that there was uncertainty as to the potential impact of fuel specifications, uncertainty concerning the possibilities of the “price-setting mechanism for gasoline” in California, and uncertainty about the return on the investment made for CARB Phase 2. (Hoffman, Tr. 4913).

## **2. Chevron**

2354. Chevron management was also skeptical about the level of investment. As Lance Gyorfi, Chevron's former Vice President of Refining explained, Chevron's refineries generally were performing "very poorly." Mr. Gyorfi was "painfully aware" that Chevron corporate and products company management was not happy with the performance of the Chevron refining system. (Gyorfi, Tr. 5212). It was clear to Mr. Gyorfi that Chevron senior management wanted to get rid of some refineries. (Gyorfi, Tr. 5212-5213).
2355. Not surprisingly, there was reluctance at Chevron to invest in more refinery modifications in the early 1990s. (Gyorfi, Tr. 5213). This reluctance was due to the fact that the corporation had a huge amount of capital tied up in the domestic refineries and the profitability and returns had been poor for a decade. They "just saw no value in sinking further capital into these refineries in the U.S." (Gyorfi, Tr. 5213).

## **3. Exxon**

2356. During the planning process, Exxon management gave serious consideration to cases "that would have the least amount of investment in California, in particular the minimal investment case." (Eizember, Tr. 3155-3156).
2357. For example, after an initial presentation on the modifications, there was "renewed interest" in the minimal investment case among Exxon management. (CX 989 at 002; Eizember, Tr. 3157). This interest was renewed because "there was a high level of concern and anxiety about spending an additional \$200 million in facilities in California." (Eizember, Tr. 3158).
2358. After the final presentation and recommendation of options, but prior to the final approval by Exxon management, Mr. Harry Longwell, president of Exxon Company USA, made it clear to Exxon planners that he was "very concerned about spending the amount of money he was requesting from [Exxon Headquarters in] Dallas on this project and earning the return on that investment." (Eizember, Tr. 3138-3139; CX 5054 at 001).
2359. Part of the anxiety of Exxon management had to do with the amount being spent on refinery modifications as compared to the amount that the refinery was worth. The Exxon planners were "recommending spending an amount of money that would double the book value of the Benicia refinery." (Eizember, Tr. 3140).
2360. The Exxon Benicia refinery had a book value, or cost minus depreciation, of about \$200 million as of 1993 or 1994. The Exxon planners were recommending in this package pursuit of an option that was projected to cost \$206 million, doubling Exxon's investment from an accounting perspective in the California market. (Eizember, Tr. 3140).

2361. The primary profitability measure that Exxon was using at the time was return on capital employed (“ROCE”). This number was determined by dividing the after tax earnings by the capital employed. (Eizember, Tr. 3155).
2362. The ROCE for the profitability of the Benicia Phase 2 modification proposals included the book value of the refinery in the denominator of the ROCE calculation. Since Exxon planners were recommending doubling that book value, they were projecting a substantial reduction in the profitability as measured by return on capital employed. (Eizember, Tr. 3140-3141).
2363. The level of investment also made Exxon “extremely interested in where our competitive position would be in California.” Exxon tracked, and reported to management, the estimation of the competitor assessment as expressed by their gasoline production in California and the amount of investment that they appeared to be announcing for the CARB Phase 2 gasoline. (Eizember, Tr. 3141).
2364. Exxon’s assessment of its competitive position ultimately played into its assessment of the likely profitability of the refinery after the Phase 2 investment. As Exxon’s lead planner explained: “We couldn’t afford to be disadvantaged by the investment.” (Eizember, Tr. 3141-3142).

#### **4. Shell**

2365. In the late 1980s and early 1990s, the financial condition of Shell’s refining business was “very, very poor.” (Banducci, Tr. 3425). In April of 1988, a major oil spill at Shell’s Martinez, California refinery caused a tremendous resource strain, both financially and from a human resources standpoint, at that refinery. (Banducci, Tr. 3427-3428).
2366. In May of 1988, there was a major refinery explosion and fire at Shell’s Norco refinery in Louisiana. (Banducci, Tr. 3428). Shell spent approximately a billion dollars over four or five years to repair the Norco facility. While it repaired this refinery, Shell needed to purchase nearly 100,000 barrels of gasoline per day to make up for the lost volume. (Banducci, Tr. 3429-3431).
2367. During the 1990 to 1992 time frame, Shell’s refining business was losing money. In 1992, the loss was approximately \$350 million. (Banducci, Tr. 3432). Shell management was displeased with the financial performance of the refining business. (Banducci, Tr. 3433).
2368. In 1991 and 1992, there were other demands on Shell’s capital funds within the refining business, including rebuilding the Norco refinery and beginning to spend money to meet environmental requirements set forth by the federal EPA at all of Shell’s refineries. A lot of spending was needed just to stay in business at the time. (Banducci, Tr. 3435-3436).

2369. There was reluctance at Shell to use capital funds in order to improve profitability within the refining business. This was because the Shell refining division had a history of committing to a return on investment that met or exceeded the hurdle rate when it undertook a new project, and then not being able to deliver on those commitments once the funds had been provided for the project. This led the refining business to have a credibility problem with the senior management. (Banducci, Tr. 3434-3435).

## **5. Texaco**

2370. In the 1980s, Texaco went through difficult financial times, including a bankruptcy. (CX 7048 (Hancock, Dep. at 259)). Due to these financial strains, Texaco's profitability declined significantly compared to the other major companies. (CX 7048 (Hancock, Dep. at 260)).

2371. Texaco's management "was very risk averse when it came to capital investments. They wanted to make sure that they placed their money in the best capital projects to return the best profit to the company...Texaco management had to have certainty, business certainty of all the challenges that it faced before they would risk anything." (CX 7048 (Hancock, Dep. at 260-261)).

2372. Texaco's refining sector, particularly California refineries, "had been losing money for years," making management "very reluctant to invest in a CARB RFG program because they had no expectation that they would ever recover those costs in the marketplace." The refining sector was "literally" the last portion of the company "to get any capital at all." (CX 7048 (Hancock, Dep. at 260)).

2373. The initial estimates for CARB compliance developed by Texaco's Refining & Marketing Division were in the three hundred to five hundred million dollar range in 1991-1992 time frame, "it sent a very bleak message to management that...the company would expose a great deal of company assets to extreme risk and not get anything back." (CX 7048 (Hancock, Dep. at 261)).

2374. Texaco finally made the decision to invest in a CARB compliance program "predicated on the assumption that [the] CARB program was as it was stated, there would be no revisions, there would be no surprises down the road." (CX 7048 (Hancock, Dep. at 261)).

### **D. Refiners Made Modifications to Produce Gasoline That Complied with CARB's Phase 2 Regulations.**

2375. The CARB Phase 2 regulations required refiners to substantially reconfigure their refineries to produce complying RFG by the effective date of March 1, 1996. (RX 1154A at 010).

2376. Refiners as a whole spent about \$4 billion to modify their refineries to meet CARB's Phase 2 regulations. (RX 1165A at 007).
2377. Eight of the 13 largest refiners accounted for over \$3.3 billion in expenditures to produce gasoline under new environmental regulations to take effect in the mid-1990s. (RX 1154A at 027).
2378. Although some modifications were necessary to meet the overlapping federal CAA Phase 1 regulations that were scheduled to take effect in January 1995, the California refiners spent billions of dollars to comply specifically with the CARB regulations. (RX 1154A at 010).

**1. ARCO (BP) Carson Refinery.**

2379. ARCO (now BP) spent \$477 million on the Carson refinery, including \$330 million specifically for CARB Phase 2 modifications. (RX 1154A at 027; Hoffman, Tr. 4888).
2380. The Carson refinery produces 180,000 barrels per day of summer gasoline, of which nearly 100% is CARB-compliant. (RX 1154A at 012).
2381. ARCO's permit process for modifications related to the CARB Phase 2 regulations were already in progress in August, 1991. (Hoffman, Tr. 4878). ARCO began more detailed engineering feasibility studies relating to RFG modifications as early as 1992. (CX 5079; RX 1154A at 013 (Sarna Expert Report)).
2382. ARCO engaged in a "Public Comment & Workshop" relating to its permit applications in March of 1993. (CX 355 at 006). Air Permits were issued to ARCO's Carson Refinery in July of 1993. (CX 355 at 006).
2383. ARCO began process engineering studies for the Clean Air Act Phase 1 projects starting in the second quarter of 1992. ARCO began process engineering studies for the CARB Phase 2 projects in the third quarter of 1992. (RX 1154A at 013). ARCO planned to select the technology and the engineering contractors by mid-1992. (CX 5052 at 020).
2384. On October 26, 1992 ARCO management signed a \$162 million authorization for commitment ("AFC") for costs to "fund the engineering, procurement and construction of the Federal Clean Air Act gasoline facilities requirement at the Los Angeles Refinery." (RX 452 at 002; CX 5052 at 002; CX 7078 (Youngman, Dep. at 17)).
2385. On September 27, 1993, ARCO management signed an AFC revision increasing authorized expenditures for the Clean Fuels Project to "fund engineering, procurement and construction of a project to produce CARB gasoline" at the Carson Refinery by an

additional \$375 million. Based upon the revision, ARCO authorized a total of \$430 million for refinery modifications needed to produce CARB compliant reformulated gasoline. (RX 452 at 024; CX 7078 (Youngman, Dep. at 17-18); CX 5052 at 024).

2386. By February 1994, ARCO was scheduled to spend in excess of \$120 million dollars of its initial \$162 million authorization towards achieving the goals of its Clean Fuels Project. Expenditures related to the Clean Fuels Project were scheduled to be completed by December 1994. (RX 452 at 021). By March 1994 ARCO expected to have spent over \$125 million on clean fuels projects. (CX 5052 at 021).
2387. ARCO began construction on CARB projects during the second half of 1994. (CX 5052 at 020).
2388. ARCO considered three cases, and ultimately chose the "Full Capital" case which required \$430 million in investments which would allow Carson to optimize the amount of CARB gasoline volumes to 142,000 barrels per day. (CX 5052 at 036).
2389. Under the investments ARCO ultimately chose, ARCO installed a new naphtha hydrotreater and an isomerization unit with a benzene saturation reactor to destroy benzene and increase octane. Besides light straight run gasoline, light reformat and light coker naphtha were also processed in the new units. In addition to reducing benzene, the processing of the light coker naphtha also resulted in a reduction of gasoline olefins and sulfur. The Udex unit was subsequently shut down when the benzene saturation unit was commissioned. (RX 1154A at 012, as illustrated by CX 7107; Sarna, Tr. 6195, as illustrated by CX 7107).
2390. In order to reduce distillation temperatures, including T50, ARCO Carson reduced the endpoint on the feed to the reformer. ARCO modified a distillation column to reduce the amount of heavy naphtha that boils above 330 degrees and they sent that to jet fuel. ARCO also added a brand new distillation column to fractionate a portion of the heavy FCC gasoline and send that very heavy portion of gasoline to the hydrocracker unit. As a result of increased flow to the hydrocracker unit, they had to modify the hydrocracking unit. Because that hydrocracking unit became bigger, it needed more hydrogen, and ARCO had to build a new hydrogen plant. (Sarna, Tr. 6195-6196, as illustrated by CX 7107; RX 1154A at 012).
2391. To reduce olefins ARCO modified and expanded an FCC gasoline hydrotreater so that the refinery could hydrotreat the intermediate portion of the FCC gasoline to a greater extent than what they had done before. ARCO also shut down its catalytic condensation unit to reduce the amount of olefins being put into gasoline. (RX 1154A at 012; Sarna, Tr. 6196-6197, as illustrated by CX 7107).

2392. To remove sulfur, ARCO Carson modified a naphtha hydrotreater to further hydrotreat coker naphtha. This allowed ARCO to take coker naphtha and saturate the olefins and reduce the sulfur in it. (RX 1154A at 012; Sarna, Tr. 6197, as illustrated by CX 7107).
2393. ARCO also modified the FCC feed hydrotreater to reduce sulfur, but did not do it to the extent needed where they could shut down the FCC gasoline hydrotreater to increase the amount of olefins. This was because the CARB regulations taught that refiners should reduce olefins, and the ARCO modifications were optimal in reducing olefins. (Sarna, Tr. 6198-6199, as illustrated by CX 7107).
2394. To meet the CARB aromatics requirements, ARCO utilized the steps described for reducing benzene. ARCO also reduced the severity in the reformer, so they made less aromatics out of the reformer. In addition, by fractionating the heavy part of the FCC gasoline in the jet cut tower, ARCO removed the heaviest portion of the FCC gasoline going back to the hydrocracker, which destroyed the aromatics in that stream. Finally, by expanding the alkylation plant, ARCO was able to dilute the aromatics in the final gasoline blend. (RX 1154A at 012; Sarna, Tr. 6197-6198, as illustrated by CX 7107).
2395. The ARCO Carson refinery was producing MTBE, but not enough to satisfy its needs for Phase 2. Therefore, ARCO Carson made arrangements to purchase additional supplies of MTBE, as well as additional supplies of alkylate. (Sarna, Tr. 6199, as illustrated by CX 7107; RX 1154A at 013).

## **2. Chevron El Segundo and Richmond Refineries.**

2396. The Chevron (now ChevronTexaco) El Segundo refinery spent \$548 million, including \$228 million specifically for CARB Phase 2 modifications. (RX 1154A at 027).
2397. The Chevron (now ChevronTexaco) Richmond refinery spent \$712 million, including \$330 million specifically for CARB Phase 2 modifications. (RX 1154A at 027).
2398. The total cost for the CARB Phase 2 modifications to both Chevron California refineries, including discretionary projects, was roughly \$1.2 billion. (Gyorfi, Tr. 5236).
2399. Chevron began engineering feasibility studies for the modification project at El Segundo to support the permitting process in 1991. Chevron had performed preliminary studies relating to RFG modifications as early as 1990 before any gasoline specification changes were adopted. Other engineering studies were being performed in 1991 and throughout 1992 to determine the most economic refinery configuration. The process engineering began in January of 1993. (RX 1154A at 015).
2400. Chevron began engineering feasibility studies for the Richmond modification project to support the permitting process in 1991. They had performed preliminary studies relating to RFG modifications as early as 1990, before any gasoline specification changes were

adopted. Other engineering studies were being performed in 1991 and throughout 1992 to determine the most economic refinery configuration. The process engineering began in the beginning of 1992. (RX 1154A at 017).

2401. Chevron's permitting applications and activities for CARB projects at El Segundo were conducted in 1992 and 1993. (CX 355 at 006).
2402. Chevron's permitting applications and activities for CARB projects at Richmond were conducted in late 1992 and 1993. (CX 355 at 006).
2403. Ultimately, Chevron chose among three options for each refinery, and chose to the full build out case for both refineries. Accordingly, Chevron made several changes to comply with the CARB regulations. (CCPF ¶¶ 2404-2416).
2404. In order to reduce benzene, Chevron El Segundo added a new naphtha prefractionator column, a Continuous Catalyst Regeneration Reformer, a new reformate splitter, and a benzene saturation unit. (Sarna, Tr. 6207-6208, as illustrated by CX 7109).
2405. In order to reduce distillation, including T50, Chevron El Segundo reduced the cut points of the naphtha by adjusting its crude unit rather than any modified piece of equipment. (Sarna, Tr. 6208, as illustrated by CX 7109).
2406. In order to reduce olefins, Chevron El Segundo revamped an FCC gasoline hydrotreater specifically so that it would treat the intermediate and light and heavy FCC gasolines because those streams have a significant level of olefins. This not only reduced the sulfur but also reduced the olefins. (Sarna, Tr. 6209, as illustrated by CX 7109).
2407. To further reduce olefins at Chevron El Segundo, the C5 olefins from the FCC went to a TAME unit where they were combined with methanol to make an oxygenate, the process of which destroyed the C5 olefins. (Sarna, Tr. 6209, as illustrated by CX 7109).
2408. Chevron El Segundo also modified a naphtha hydrotreater to take naphtha from the coker and saturate the olefins in it, because coker naphtha also has quite a bit of olefins. (Sarna, Tr. 6209, as illustrated by CX 7109).
2409. To reduce aromatics, Chevron El Segundo built a new alkylation unit, and that helped to dilute the aromatics. (Sarna, Tr. 6212, as illustrated by CX 7109).
2410. To reduce sulfur, Chevron El Segundo modified the naphtha hydrotreater and modified the FCC gasoline hydrotreater, which both reduced sulfur and saturated olefins. Chevron El Segundo also built a new alkylation unit and by using more alkylate, that diluted the sulfur. (Sarna, Tr. 6213, as illustrated by CX 7109).

2411. In order to reduce benzene to meet the CARB specifications, Chevron Richmond added a new naphtha prefractionation column. Chevron Richmond also added a benzene saturation unit and a reformat splitter column. (Sarna, Tr. 6217, as illustrated in CX 7111).
2412. In order to reduce T50 to meet the CARB specifications, Chevron changed cut points on the crude unit and also the hydrocracking units at the Chevron Richmond refinery. (Sarna, Tr. 6217, as illustrated in CX 7111).
2413. The Chevron Richmond refinery had very low olefin levels to begin with, but Chevron reduced the olefin levels even further to meet the CARB specifications by installing a TAME unit, which destroyed the C5 olefins from the FCC unit and made TAME. The C5 olefins not converted in the TAME unit then went to a new alkylation unit. The Chevron Richmond refinery also reduced olefin levels by discontinuing the use of their catalytic polymerization unit to make gasoline. (Sarna, Tr. 6218, as illustrated in CX 7111).
2414. In order to reduce aromatics to meet the CARB specifications, Chevron reduced the endpoint on the feed to the reformer at the Chevron Richmond refinery, which had the effect of not only lowering the distillation temperatures of the gasoline, but also reducing the capacity of the reformer. Also, by building a new alkylation unit at a higher capacity, Chevron Richmond was able to dilute the aromatics. (Sarna, Tr. 6219, as illustrated in CX 7111).
2415. The Chevron Richmond refinery already had low sulfur levels, but was able to further reduce them for CARB Phase 2 by building the new alkylation unit and putting more alkylate into the gasoline, which had the effect of lowering the sulfur to the point that it needed to be. (Sarna, Tr. 6219-6220, as illustrated in CX 7111).
2416. Chevron Richmond also constructed two discretionary projects in order to increase production, namely FCC modernization and the alkylation plant expansion and modernization. (Gyorfi, Tr. 5217-5218).

### **3. Exxon (Valero) Benicia Refinery.**

2417. The Exxon (now Valero) Benicia refinery spent \$193 million specifically for CARB Phase 2 modifications. (RX 1154A at 027).
2418. The deadline for complying with the CARB regulations was not until March 1996. (Eizember, Tr. 3105).
2419. In order for Exxon to complete the Benicia modifications process by March 1996, Exxon completed its screening studies by the third quarter of 1992. (Eizember, Tr. 3111-3112; CX 975 at 026). For the same reason, Exxon completed its definitive planning basis by

- October 20, 1992 (CX 975 at 001-002, 026; Eizember, Tr. 3106, 3109-3110). Likewise, Exxon completed its permit applications by the end of 1992 and actually filed its permit application with the Bay Area Air Quality Management District and the City of Benicia in January 1993. (CX 975 at 026; Eizember, Tr. 3110; CX 5057 at 001).
2420. As it sought its permit applications, Exxon continued with its modification planning and implementation. On June 23, 1993, the Exxon Management Committee approved the award of the \$225 million Benicia Engineering/Procurement/Construction (“EPC”) contract to The Ralph M. Parsons Company. (CX 5058 at 001). This EPC contract was entered into on June 30, 1993. (CX 5059 at 005; Eizember, Tr. 3115).
2421. The EPC contractor was the primary contractor in charge of doing the detailed engineering, buying the materials, and then erecting all of the steel that ultimately became the Benicia Modifications Project. (Eizember, Tr. 3115).
2422. On April 18, 1994 the Exxon Management Committee approved the final \$176 million for the Benicia Phase 2 modifications. This brought the total amount approved to \$206 million. (CX 5066 at 002; Eizember, Tr. 3132-3133). Exxon ultimately spent approximately \$190 million on the Phase 2 projects. (Eizember, Tr. 3135).
2423. The project continued and mechanical completion was achieved six days ahead of schedule on November 30, 1995. (CX 5069 at 004; Eizember, Tr. 3136).
2424. At the screening stage of the Benicia Phase 2 modifications project, Exxon considered “lots” of options. (Eizember, Tr. 3137). However, before submitting these options to management, Exxon had to narrow the list of options. (Eizember, Tr. 3137). This list was narrowed to five main options at the time that Exxon planners sought the final appropriations, which was in April 1994. (Eizember, Tr. 3137; CX 5054 at 009).
2425. Ultimately, Exxon planners recommended the second most expensive option. (Eizember, Tr. 3155).
2426. The refinery did not produce CAA Phase I gasoline, and therefore, did not carry out the project in two stages as other refiners did. The Benicia refinery CARB Phase 2 modification involved more new process units than revamps. The total cost for the gasoline reformulation modifications was about \$193 million. (RX 1154A at 019).
2427. To reduce benzene, the Exxon Benicia refinery installed a new heartcut fractionator and a benzene saturation unit. (Sarna, Tr. 6223, as illustrated in CX 7113).
2428. To reduce the levels of T50 and T90 the Exxon Benicia refinery did two things. First, Exxon installed two splitter columns. One took the bottoms from the heartcut fractionator and fractionated it into two streams. One stream went to gasoline blending.

The heavy stream went to the hydrocracker where the heavy molecules were cracked to lighter ones. (Sarna, Tr. 6223-6224, as illustrated in CX 7113).

2429. Exxon also reduced the levels of T50 and T90 at the Exxon Benicia refinery by installing another splitter column that split heavy FCC gasoline stream into two pieces, the heaviest portion going to the hydrocracker where the heavy molecules were cracked to lighter ones. (Sarna, Tr. 6223-6224, as illustrated in CX 7113).
2430. In order to adjust the level of olefins, Exxon built a new gasoline hydrotreater and revamped an existing gasoline hydrotreater at the Benicia refinery. This had the effect of lowering sulfur, but it also had the effect of destroying much of the olefins produced in the FCC unit. (Sarna, Tr. 6224-6225, as illustrated in CX 7113).
2431. In order to reduce the level of aromatics in the gasoline pool, Exxon decreased the cut point on the feed to the reformer at the Exxon Benicia refinery, which decreased the amount of reformate that they produced. In addition, installing the splitter columns to reduce T50 and T90 removed the heaviest portion of aromatics from the reformate and also from the FCC gasoline. These things combined reduced aromatics. Moreover, the alkylation unit was modified to produce more alkylate, and by dilution effect, producing more alkylate reduced the aromatics. (Sarna, Tr. 6225-6226, as illustrated in CX 7113).
2432. To reduce sulfur, Exxon Benicia built a new FCC gasoline hydrotreater and revamped the existing FCC gasoline hydrotreater. The building of the new alkylation unit made more alkylate and therefore had the effect of diluting sulfur. (Sarna, Tr. 6226, as illustrated in CX 7113).

#### **4. Mobil (ExxonMobil) Torrance Refinery.**

2433. The permitting process at Mobil Torrance was carried out through 1993. (RX 1154A at 022).
2434. By December 1993, there had already been a public comment and workshop on Mobil's permit application. (CX 355 at 006).
2435. The Mobil (now ExxonMobil) Torrance refinery spent \$126 million, including \$57 million specifically for CARB Phase 2 modifications. (RX 1154A at 027).
2436. Because Mobil ran San Joaquin Valley crude oil undiluted, Torrance did not have very much straight-run naphtha to deal with, and therefore did not need to do very much to reduce benzene. Mobil Torrance did reduce the severity of the reformer, which made less aromatics, including less benzene. In addition, Torrance purchased MTBE as part of the Phase 2 regulations, and that helped to dilute benzene. (Sarna, Tr. 6232, as illustrated by CX 7115).

2437. Because of their significant market out of state, Mobil Torrance did very little to reduce its T50 temperature. (Sarna, Tr. 6233, as illustrated by CX 7115).
2438. Because Torrance had installed a very severe FCC feed hydrotreater prior to the CARB 2 modifications, the Torrance FCC unit was able to produce a gasoline that had very low sulfur. Therefore, they were able to maintain the level of olefins they had and meet the CARB Phase 2 olefin standards by taking high olefin streams and sending them out of the state. (Sarna, Tr. 6233, as illustrated by CX 7115).
2439. In order to reduce the level of aromatics at the Torrance refinery, Mobil reduced the cut point on their reformer feed and also reduced the severity of the operation of the reformer, and that lowered the aromatics concentration. In addition, by expanding the alkylation unit, the Torrance refinery diluted aromatics. (Sarna, Tr. 6233-6234, as illustrated by CX 7115).
2440. In order to reduce the level of sulfur at the Torrance refinery, Mobil installed an FCC feed hydrotreater that operates at high pressure and high severity, and that lowered the sulfur in the feed to the FCC unit. However, Mobil Torrance could have achieved the cap limits for Phase 2 sulfur prior to those specifications being enacted. (Sarna, Tr. 6234, as illustrated by CX 7115).

#### **5. Shell Martinez Refinery.**

2441. In 1991, Shell believed that CARB regulations would impact Shell's three West Coast refineries: Wilmington Los Angeles, Martinez, and Anacortes. (Banducci, Tr. 3437).
2442. The Shell Martinez refinery spent \$1.1 billion, including \$285,700,000 million specifically for CARB Phase 2 modifications. (Banducci, Tr. 3448, 3557; CX 2113 at 012). The residue reduction portion of this project cost \$772 million. (Banducci, Tr. 3452).
2443. In addition, Shell spent an estimated \$71 million in capital expenditure for the modifications at the Anacortes refinery was. (CX 5128 at 004).
2444. Shell chose not to make the necessary modifications to comply with these regulations at its Los Angeles refinery. This is not the same as the Bakersfield refinery, which Shell did not own at the time, but which Shell is now trying to close. (Banducci, Tr. 3438-3439).
2445. Shell began engineering feasibility studies for the modification project at Martinez to support the permitting process in 1991. Other engineering studies were being performed in 1991 and throughout 1992 to determine the most economic refinery configuration. The process engineering was begun in January of 1993. (RX 1154A at 023).

2446. In October 1991, Shell began its preparation of the land use permit. The permit application was submitted in February of 1992 with authority to construct being received in December of 1993. (CX 5097 at 001; CX 355 at 006); Banducci, Tr. 3505-3506; CX 5112). Twenty-two months passed from the submittal of the land use permit application to the finalization of the BAAQMD permit. (CX 5097 at 001).
2447. Shell received its land-use permit on October 12, 1993. Shell was not permitted to start construction at the Martinez facility prior to this date. Shell did not do any construction at all or any preparation of the lands prior to this date. (Banducci, Tr. 3505; CX 5110 at 002).
2448. In deciding what options to select at the Martinez facility, Shell management considered four options. (Banducci, Tr. 3451).
2449. Shell ultimately chose to pursue the third option, which was the one that enabled Martinez to produce the same amount of CARB-compliant gasoline as the gasoline that had been produced in the pre-CARB era while also allowing the heavy and low-valued products to be upgraded into light products. (Banducci, Tr. 3451).
2450. Under this option, the goal was for 100 percent of the gasoline output to be CARB Phase 2 compliant. (Banducci, Tr. 3452).
2451. The modifications Shell ultimately selected were geared towards meeting the CARB specifications. In order to reduce benzene, Shell Martinez installed a decyclohexanizer column and a benzene saturation unit. Shell also reduced the severity in the reformer. (Sarna, Tr. 6237, as illustrated by CX 7117).
2452. To reduce T50, Shell Martinez had an existing column that removed the heavier portion of the naphtha and then sent that to diesel fuel. (Sarna, Tr. 6238, as illustrated by CX 7117).
2453. In order to reduce olefins, the Martinez refinery installed two new hydrotreating units. One was called a catalytic distillation unit, and another was just called the FCC gasoline hydrotreater. (Sarna, Tr. 6239, as illustrated by CX 7117).
2454. In order to reduce aromatics, the Martinez refinery revamped its reformer and its reformate splitter. Martinez also reduced the severity of the reformer, and installed a splitter column to take the heaviest part of the reformate and that contains heavy aromatics with fairly low octanes and removed those and put those into a distillate hydrotreater. (Sarna, Tr. 6240, as illustrated by CX 7117).

2455. In order to reduce sulfur, the Martinez refinery treated the FCC gasoline and built two new gasoline hydrotreaters to go along with an existing FCC gasoline hydrotreater. (Sarna, Tr. 6240-6241, as illustrated by CX 7117).
2456. In addition, the Martinez refinery installed considerable additions in the utilities and off-site areas, and also purchased some alkylate and some MTBE. (Sarna, Tr. 6328-6329, as illustrated by CX 7117).
2457. Shell also considered modifying its Anacortes refinery in 1991 in order to produce CARB Phase 2 compliant gasoline. (Banducci, Tr. 3453).
2458. The first option considered at the Anacortes refinery was again a no-capital case. (Banducci, Tr. 3454).
2459. The other option considered at Anacortes was an option that would enable Shell to continue to supply the California volumes that it had in the recent past, which was approximately 25,000 barrels a day. (Banducci, Tr. 3455). Shell ultimately chose to produce approximately 25,000 barrels a day of CARB-compliant gasoline at the Anacortes refinery at a projected capital expenditure of approximately \$71 million. (Banducci, Tr. 3456; CX 5128 at 004).
2460. Shell decided to sell its Los Angeles refinery rather than modify it to comply with the CARB regulations. Shell anticipated that approximately \$400 to \$500 million dollars would have been necessary to comply with the CARB regulations at Los Angeles. There was one buyer who was interested in half of the refinery, and that site was sold to this particular buyer, which was Unocal. (Banducci, Tr. 3440-3441). The refinery's other site was shut down and its processing units dismantled, and Shell continued to operate the tankage at the site basically as a terminal. (Banducci, Tr. 3441).

## **6. Texaco (Shell) Wilmington and Bakersfield Refineries.**

2461. The Texaco (now Shell) Wilmington refinery spent \$125 million, including \$83 million specifically for CARB Phase 2 modifications. (RX 1154A at 027).
2462. The Texaco (now Shell) Bakersfield refinery spent \$21 million specifically for CARB Phase 2 modifications. (RX 1154A at 027).
2463. Texaco always viewed its Bakersfield Refinery as a marginal refinery, making it difficult for management to justify modifications. Management delayed "decisions on investment until they were sure it made sense from a business perspective." The decision to go forward with modifications was made in early 1995, allotting a year or so lead time prior to compliance. (CX 7048 (Hancock, Dep. at 161)).

2464. In order to reduce benzene, Texaco Wilmington modified an existing prefractionation tower, modified an existing reformate splitter tower and added a new benzene saturation unit. (Sarna, Tr. 6336, as illustrated by CX 7105).
2465. In order to reduce T50, Texaco Wilmington did several things. First, the modification of the prefractionation tower allowed a portion of the heavy naphtha to be put into diesel fuel. (Sarna, Tr. 6336, as illustrated by CX 7105).
2466. Second, the heavy portion of the reformate from the revamped reformate splitter tower was sent to the hydrocracker. (Sarna, Tr. 6336, as illustrated by CX 7105).
2467. Third, modification of an FCC gasoline distillation column allowed the heavy portion of the FCC gasoline to be put into the hydrocracker. As a result of doing those things, the hydrocracker capacity increased, so it needed to be revamped. Because that unit needed to be revamped, Texaco also had to revamp the hydrogen plant to provide more hydrogen to it. (Sarna, Tr. 6336-6337, as illustrated by CX 7105).
2468. In order to reduce olefins, Texaco Wilmington took a portion of the bottoms from the splitter column which contained olefins and sent that to the hydrocracker, which had the effect of lowering sulfur and lowering olefins. Texaco Wilmington also revamped the alkylation unit, and purchased additional MTBE, which had the effect of lowering olefins, aromatics and sulfur by dilution. (Sarna, Tr. 6337, as illustrated by CX 7105).
2469. In order to reduce aromatics, Texaco Wilmington prefractionated the reformer feed, removing the heavy part of it and making less reformate. Texaco Wilmington also reduced aromatics by modifying the reformate splitter to remove the heavy part of the reformate. (Sarna, Tr. 6337-6338, as illustrated by CX 7105).
2470. Texaco Wilmington also reduced aromatics by saturating benzene, which is an aromatic. Furthermore, Texaco Wilmington modified the alkylation unit to produce more alkylate, and added MTBE, which reduced aromatics by dilution. (Sarna, Tr. 6337-6338, as illustrated by CX 7105).
2471. Texaco Wilmington had low sulfur to begin with, but further reduced its levels of sulfur by splitting the FCC gasoline and putting the heavy part into the hydrocracker. Texaco Wilmington also reduced sulfur through dilution by expanding the alkylation unit. (Sarna, Tr. 6338, as illustrated by CX 7105).
2472. To meet CARB Phase 2 T50 and T90 specifications, Texaco's Bakersfield Refinery made extensive modifications to their gasoline/naphtha distillation equipment including modifications to the crude unit fractionator, the hydrocracker main fractionator, and the reformate splitter tower. And idle alkylation splitter was also started to handle imported alkylate because the refinery had no alkylation capacity. (CX 7048 (Hancock, Dep. at 160)).

2473. In order to reduce benzene, Texaco Bakersfield installed a new unit called the benzene saturation unit, which destroyed benzene that was produced in the reformer unit. Texaco Bakersfield also pre-fractionated the feed to the reformer and removed the precursors, which is cyclohexane, before it went into the reformer and was converted to benzene. (Sarna, Tr. 6341-6342).
2474. In order to reduce T50, Texaco Bakersfield made changes in the crude unit to reduce cut points, primarily the cut point to the reformer, but also cut points on the hydrocracker, so as to reduce the cut points of the hydrocracked gasoline. (Sarna, Tr. 6342).
2475. In order to reduce olefins, Texaco modified the naphtha hydrotreater at the Bakersfield refinery and then put the light naphtha from the coker into that modified naphtha hydrotreater to saturate all the olefins, and at the same time it also reduced sulfur. (Sarna, Tr. 6342).
2476. To reduce aromatics, Texaco Bakersfield took the steps to reduce benzene, but ultimately there was very little that could be done to reduce the aromatics. (Sarna, Tr. 6343).
2477. In order to reduce sulfur, Texaco Bakersfield modified the naphtha hydrotreater and also modified the hydrocracker. (Sarna, Tr. 6343).

**E. Refiners Chose Alternatives That Pushed the Refiners Towards the Unocal Patents.**

2478. Without knowledge of Unocal's patents, refiners made their modifications with the objective of lowering the concentrations of olefins and distillation temperatures (T50 and T90), as the CARB regulations directed them to do. These strategies had the effect of driving the refiners' CARB Phase 2 summer gasoline production towards the patents. (RX 1154A at 010).
2479. Olefin levels and distillation temperatures at California refineries were on average high enough before the adoption of the CARB Phase 2 specifications to avoid overlap with claims of the patents, but lower than the cap limits allowed by CARB. (RX 1154A at 010).
2480. Prior to Phase 2, most refiners had gasoline pools that on average had T50 temperatures above 210 degrees. The average T50 temperature for all California refiners was 212 degrees. (CX 5 at 016; Sarna, Tr. 6204).
2481. As a result of the Phase 2 modifications, those T50 temperatures were brought down. Some refiners brought their T50 temperatures down as low as 195 degrees. (Sarna, Tr. 6205).

2482. The average olefin level for all California refiners in 1991 was 9.60. (CX 5 at 016). Consistent with the teachings of CARB, refiners tried to lower the olefin levels. (Sarna, Tr. 6206). {

} (RX 1165 at 050, *in camera*).

2483. The average T50 for all California refiners in 1991 was 212 degrees. (CX 5 at 016). {

} (RX

1165 at 050, *in camera*).

2484. Prior to making its Phase 2 modifications, the typical olefin level at the Chevron El Segundo refinery was 13 %. (CX 5018 at 006).

2485. {

} (RX 1165 at 050, *in camera*).

2486. Prior to making its modifications, the typical T50 at the Chevron El Segundo refinery was 205 degrees Fahrenheit. (CX 5018 at 006).

2487. {

} (RX 1165 at

050, *in camera*).

2488. The typical olefin level at Benicia prior to the Phase 2 modifications was 13 percent. (Eizember, Tr. 3143).

2489. {

} (Eizember, Tr. 3143; RX 1165 at 050, *in camera* {  
}).

2490. The typical T50 at Benicia prior to the Benicia modifications was 220 degrees Fahrenheit. (Eizember, Tr. 3144).

2491. {

} (Eizember, Tr. 3144; RX

1165 at 050, *in camera* {  
}).

2492. When planning the Phase 2 modifications at Benicia, Exxon did not try to raise the T50 in Benicia's gasoline pool because the CARB regulations would require a lower T50. (Eizember, Tr. 3177).

2493. In fact, when planning the Phase 2 modifications at Benicia, Exxon was not trying to maintain an olefin level that was at the higher end of the allowable level under the CARB regulations because Exxon was targeting for a lower average level and thought that reducing olefins was consistent with the general direction of the regulations. (Eizember, Tr. 3177-3178).
2494. In developing its planning basis for the CARB Phase 2 modifications, Exxon selected target values so that the refinery would be operable on average during the gasoline blending season and as such they would have been set close to the CARB average specifications. (Eizember, Tr. 3142). For example, the T50 was reduced to a target of 200 degrees because the CARB average specification was 200 degrees. (Eizember, Tr. 3144).
2495. In analyzing how to make its modifications, ARCO's plan was based on reducing its gasoline specifications below the CARB specifications required. Significantly, ARCO planned on reducing its T50 to 200 degrees Fahrenheit and its olefin level to 4.5 percent. (CX 5079 at 002).

## **XIX. Unocal Perfected its Patent Ambush Following CARB's Adoption of the Phase 2 Regulations.**

### **A. Unocal Knew That Refiners Were Making Specific Investments Totalling Several Billions of Dollars to Comply with the CARB Phase 2 Regulations.**

2496. Unocal knew that Unocal's California refining competitors were making substantial modifications to comply with CARB's Phase 2 regulations. One reason that Unocal knew that refiners were making these investments is because Unocal itself was a refiner and estimated that it would expend \$365,650,000 to modify the two Unocal refineries to produce Phase 2-compliant gasoline. (CX 513 at 001; Beach, Tr. 1707-1708).
2497. In 1993, Unocal contracted with the consulting firm PACE "to calculate Unocal's incremental costs for taking CARB Phase 2 gasoline over EPA Phase Ia gasoline" at Unocal's Los Angeles Refinery. (CX 328 at 010). The results of that analysis, which was based on LP runs, predicted that Unocal would have to spend \$281mm in specific investments to produce Phase 2 gasoline, which was less than the \$320mm in specific investments predicted by Unocal's refining department. (CX 328 at 011).
2498. In 1993, Unocal estimated that it would cost 10.6 cents per gallon more to produce CARB Phase 2 gasoline at Unocal's Los Angeles refinery than to produce EPA Phase 1 gasoline at that refinery. (CX 328 at 003, 011-012). Unocal's own planning documents demonstrate that a 0.5 cent per gallon cost is significant for a refiner. (CX 328 at 011 (noting "significant findings" such as a potential 0.5/g cost savings)).

2499. In September 1994, Unocal was behind other refiners in completing its Phase 2 modifications. (CX 355 at 006). In fact, Unocal's CEO, Roger Beach, wrote to James Boyd, CARB's executive officer, in November 1994, to inform CARB that Unocal was "encountering significant obstacles" in obtaining the necessary permits for its refineries and that construction at its Los Angeles refinery was stalled by a union lawsuit. (CX 1005 at 001-002; Beach, Tr. 1711-1712).
2500. After the Unocal '393 patent issued, Unocal kept abreast of the progress of the other refiners in implementing changes to comply with Phase 2. (CX 1005 at 001-002 ("Unocal has read with interest your letter . . . which described the status of California oil refiners in preparing to make CARB Phase 2 reformulated gasoline"))).
2501. An internal August 4, 1994 Unocal document entitled, "Top Project Goals for 1994," lists the "Potential Impact" of Unocal's RFG patent as "\$30MM to \$135MM per year" under the assumption of "PACE estimate at 1¢/gallon." (CX 517; Jessup, Tr. 1328-1329). That same document listed the "RFG Patent" as Dr. Jessup's second highest priority. (CX 517). As Dr. Jessup (the inventor of the Unocal patents) explained, he has continued to work on the other four Unocal patents "until this day." (Jessup, Tr. 1329).
2502. Unocal was monitoring what actions the other refiners were taking with respect to the Phase 2 RFG modifications by "monitoring the monitors." (Lamb, Tr. 1923). Denny Lamb understood that CARB requested periodic compliance reports because CARB had an interest in ensuring there was an adequate supply of RFG as of the effective date of the regulations in 1996. (Lamb, Tr. 1923).
2503. In September 1994, CARB estimated the aggregate total production by refiners of Phase 2-compliant gasoline would be in the range of 880,000 to 1,000,000 barrels per day. (CX 355 at 005). This was sufficient to meet the demand projected by a November 1992 Caltrans report, which predicted consumption in 1996 to be between 860,000 to 920,000 barrels per day. (CX 355 at 005).
2504. Dr. Jessup, the inventor of the Unocal patents, knew that the CARB regulations had an enormous impact on oil companies, causing a total combined expenditure of about \$5 billion for refinery modifications. (Jessup, Tr. 1325-1326).
2505. In a February 1995 internal Unocal presentation, Dr. Jessup explained that the CARB Phase 2 regulations would result in California refiners spending \$5 billion in capital investments and a consumer price increase of 5-20 cents per gallon. (CX 385 at 027; Jessup, Tr. 1326-1327).
2506. Unocal's Chief Patent Counsel, Gregory Wirzbicki, in 1995 represented to the U. S. Patent and Trademark Office that oil companies were spending billions to comply with CARB regulations covered by Unocal's patent claims. On February 5, 1995, Mr. Wirzbicki made a series of arguments to the patent examiner in an amendment he filed

with the PTO in the divisional application that lead to the '567 patent. (CX 1791 at 487-527). Mr. Wirzbicki continued to state in the February 5, 1995, filing to the PTO to state that "oil companies . . . are currently spending enormous sums – in the billions, aggregate – to produce gasolines meeting these 1996 regulations." (CX 1791 at 510; Wirzbicki, Tr. 1003-1005).

2507. Mr. Wirzbicki also submitted in the February 5, 1995, filing with the PTO an article dated October 10, 1994, about refiners' financial outlays in response to environmental regulations. (CX 1791 at 521-525).
2508. Following the February 5, 1995, filing with the PTO, Mr. Wirzbicki on behalf of Unocal abandoned the divisional application and "filed a continuation with the same claims in order to give [Unocal] more time" to prosecute the application. (Wirzbicki, Tr. 1006-1007; CX 1792 at 002-003).
2509. The Unocal continuation application was assigned a different number (*e.g.*, the '074 application) but is part of the same file as the first divisional Unocal application. (Wirzbicki, Tr. 1006-1008; CX 1792 at 002-006).
2510. In a preliminary amendment filed in the Unocal continuation application on June 6, 1995, Mr. Wirzbicki made another reference to the amount of money that refiners were spending to comply with CARB regulations. (CX 1792 at 118-133; Wirzbicki, Tr. 1008-1009). That filing referred to "reports that the oil industry is incurring costs in the billions of dollars to comply with California 1996 RFG . . ." (CX 1792 at 133).

**B. Unocal Knew That Refiners Were Making Modifications to Produce Gasoline That Would Fall Within the Claims of Unocal's Patents.**

2511. After CARB adopted its Phase 2 regulations, Roger Beach (then the President and Chief Operating Officer of Unocal) was informed that "there would be some percentage of gasoline produced, in our opinion, that would fall under [the Unocal] invention." (Beach, Tr. 1713-1714).
2512. In an August 3, 1992, memorandum, Stephen Lipman (President of Unocal's Science & Technology Division) informed Mr. Beach that "Unocal received an informal notice from the U.S. Patent & Trademark Office that it would allow claims to Unocal's reformulated gasoline. These claims are broad enough to cover all gasoline fuels to be sold in California under current CARB regulations starting in March 1996." (CX 593 at 003; Beach, Tr. 1714-1715). Mr. Beach could not recall anyone at Unocal informing CARB of this information. (Beach, Tr. 1716).
2513. Mr. Wirzbicki argued in the February 5, 1995, filing with the U.S. Patent and Trademark Office on behalf of Unocal that the patent examiner should consider "the importance of the invention to the public." (CX 1791 at 509). He then stated that "the regulations of

the California Air Resources Board will soon (in 1996) come into effect mandating gasolines of reduces RVP, T50, etc. (which for the most part, if not exclusively, fall within the scope of the compositions required in one or more of the method claims herein).” (CX 1791 at 509-510; Wirzbicki, Tr. 1003-1005).

**C. Unocal’s ’393 Patent Issued in February 1994.**

2514. The U.S. Patent and Trademark Office issued U.S. Patent No. 5,288,393 (“’393 patent”) on February 22, 1994. (CX 617; Wirzbicki, Tr. 984). Mr. Wirzbicki, Unocal’s Chief Patent Counsel, received it a few days later. (Wirzbicki, Tr. 984). The inventors were identified as Peter Jessup and Michael Croudace, and the assignee of the patent was Unocal. (CX 617 at 001).
2515. Unocal later obtained Certificates of Correction correcting typographical errors made by the U.S. Patent and Trademark Office in the printed version of the ‘393 patent specification. (RX 793 at 027-028; CX 1788 at 454-455).
2516. Mr. Wirzbicki circulated the ‘393 patent to Roger Beach, Neal Schmale, Don D’Zurilla, Dennis Lamb, Nick Economides, Wayne Miller, and Peter Jessup on March 1, 1994. (CX 339; Wirzbicki, Tr. 984-985). By the mid-to late 1990’s, the Science and Technology Division had been disbanded and the patent department was subsumed by Unocal’s law department. (Wirzbicki, Tr. 877).
2517. The ‘393 patent was the only patent circulated to Mr. Beach during all his years at Unocal. (Beach, Tr. 1717).
2518. Once it issued, Mr. Wirzbicki personally briefed the executive committee of Unocal management on his views of the ‘393 patent. (Wirzbicki, Tr. 985-987).

**D. Unocal Waited Nearly a Year to Publicly Announce the Issuance of its Patent, Announcing its Patent by a Press Release on January 31, 1995.**

2519. Even though the ‘393 patent issued in February 1994, Unocal did not publicly announce the issuance of the ‘393 patent until it issued a press release on January 31, 1995 – nearly a year after the U.S. Patent and Trademark Office issued the patent. (Wirzbicki, Tr. 984, 987; CX 599).
2520. The issuance of its reformulated gasoline patent was clearly significant to Unocal. Mr. Wirzbicki, Unocal’s Chief Patent Counsel, sent a copy of the issued patent to Mr. Beach, who was then the President and Chief Operating Officer of Unocal. (CX 339 at 001). During all his years at Unocal, this was the only patent Mr. Beach had ever been given. (Beach, Tr. 1717).

2521. As Roger Beach admitted on cross-examination, Unocal delayed about a year between the issuance of its patent and issuance of its press release about the patent because Unocal did not want to “make a press release too far ahead of the implementation of CARB Phase 2 gasoline.” (Beach, Tr. 1718).
2522. On December 5, 1994, Unocal issued a press release announcing the launch of its reformulated fuels in southern California. (CX 358 at 001-002). In this press release, Unocal boasted that its “scientists played a significant role in the creation of the next generation of state and federal reformulated gasolines.” (CX 358 at 001). The press release went on to describe, in broad terms, Unocal’s 5/14 Project, which “verified for the first time how certain fuel properties have a dramatic affect on emissions.” (CX 358 at 004). Though released nearly ten months after the ’393 patent had been issued to Unocal, the press release made no mention of the issuance of the ’393 patent. (CX 358 at 001-002).
2523. Unocal’s January 31, 1995, press release indicated that the patent “covers many of the possible fuel compositions that refiners would find practical to manufacture and still comply with the strict California Air Resources Board (CARB) Phase 2 requirements.” (CX 375).
2524. Unocal’s January 31, 1995, press release stated that Unocal’s patent will “pose no barrier to implementation of the CARB Phase 2 regulations.” (CX 375).
2525. Unocal’s January 31, 1995, press release stated that the patent application had been filed in December 1990 and that “[t]he U.S. Patent Office issued Unocal a patent on the fuel in February 1994.” (CX 375).
2526. Unocal’s January 31, 1995, press release said that Unocal would offer non-discriminatory licenses to the industry. (CX 375).
2527. Unocal also announced that it planned to offer its patent for license. (CX 599). This announcement followed letters sent from the CEOs of Chevron and Texaco to Roger Beach, Unocal’s CEO, inquiring about Unocal’s plans. (CX 369; CX 370).
2528. Unocal did not publicly announce the issuance of the ’393 patent until a January 31, 1995 press release. (CX 599 at 002).
2529. In its January 31, 1995, press release, Unocal told the public that “Unocal’s patent covers many of the possible fuel compositions that refiners would find practical to manufacture and still comply with the strict California Air Resources Board (CARB) Phase 2 requirements in 1996.” (CX 599 at 002; CX 378 at 002).
2530. Unocal’s Chief Patent Counsel, Mr. Wirzbicki, had reviewed a draft of the January 31, 1995 press release before it was issued. (Wirzbicki, Tr. 990).

2531. Mr. Wirzbicki also reviewed a number of Q&A's related to the '393 patent for accuracy, and discussed them with members of Unocal's public relations group such as Barry Lane and Mike Thacher. (Wirzbicki, Tr. 991-992, 1030).
2532. Mr. Wirzbicki continues to believe that the January 31, 1995 press release is accurate. (Wirzbicki, Tr. 890-891).
2533. By the time Unocal issued its January 1995 press release, Unocal had already on December 29, 1994, disclaimed a number of its patent claims. (CX 1788 at 460-465; Wirzbicki, Tr. 987-988). The disclaimer had the effect of removing the claims from the patent. (Wirzbicki, Tr. 987-988; CX 1788 at 460-461).
2534. Thus, even after filing the December 29, 1994, disclaimer, Unocal believed and stated on January 31, 1995, that "Unocal's patent covers many of the possible fuel compositions that refiners would find practical to manufacture and still comply with the strict California Air Resources Board (CARB) Phase 2 requirements in 1996." (CX 599 at 002; CX 1788 at 460-465; Wirzbicki, Tr. 987-988).
2535. Unocal filed an additional disclaimer on July 5, 1995, after litigation was already in progress concerning infringement of the '393 patent. (CX 1788 at 476-481; Wirzbicki, Tr. 988).
2536. After the '393 patent issued, Mr. Beach formed the view that the royalty for the patent would be between four and ten cents per gallon. (Beach, Tr. 1686-1688).
2537. Unocal recognized that as of 1995, "refiners throughout are already well along in modifying their plants so they can make the Phase 2 gasolines." (CX 378 at 001; Beach, Tr. 1689-1690 (Beach admitting that he authorized this statement)). In fact, Unocal saw that "all refiners planning on selling Phase 2 gasoline have been moving forward with the required capital projects. They will have the equipment and know-how to manufacture complying fuels, which happens to fall under our patent protection." (CX 378 at 007; Beach, Tr. 1691-1692). According to Unocal, "[o]il companies have had nearly five years to prepare a cost-effective product that meets the new requirements." (CX 378 at 008; Beach, Tr. 1692). During those five years preparing to produce Phase 2 gasoline, the oil companies did not know of Unocal's plan to demand patent royalties. (Beach, Tr. 1692).
2538. Unocal was also aware that "all refiners planning on selling Phase 2 gasoline have been moving forward with the required capital projects. They will have the equipment and the know-how to manufacture a complying fuel, which happens to fall under our patent protection". (CX 401 at 008 (Unocal's Governor Wilson Briefing: RFG Patent)).

2539. Although Unocal knew that the California refiners were already moving ahead to make modifications to manufacture CARB Phase 2-compliant gasolines at this time, Unocal said that the Unocal patent would “not affect the work already under way”. (CX 401 at 011 (Unocal’s Governor Wilson Briefing: RFG Patent)).
2540. Unocal said that its patent would have no bearing on supply or compliance issues because “everyone’s had five years to review and prepare to meet CARB’s requirements”. (CX 399 at 009 (Draft Materials on Unocal’s RFG Patent)).
2541. Unocal said that a disruption in supply just because of the Unocal patent is unlikely because the oil companies had five years to modify refineries, distribution systems and services stations to accommodate new fuels. (CX 399 at 011 (Draft Materials on Unocal’s RFG Patent)).
2542. In its background information provided to members of Congress, Unocal stated that it filed for its patent “in December 1990, after spending millions of dollars over a period of months to develop independently formulations for low-emitting gasolines.” (CX 430 at 001, 006). Unocal’s internal documents, however, show that it spent less than one million on its research for the 5/14 Project. (CX 179 at 001).

**E. Refiners Learned about the ‘393 Patent, But Were Stuck with Their Refinery Modifications.**

2543. Shortly after Unocal’s ‘393 patent issued on February 22, 1994, a few refiners learned about the existence of the patent. (CX 7048 (Hancock, Dr. at 272-273); Gyorfi, Tr. 5258).

**1. Texaco and Chevron Learned of the Patent in March 1994.**

2544. Texaco first became aware of Unocal’s ‘393 patent in March 1994. (CX 7048 (Hancock, Dep. at 272-273)). Texaco learned of the ‘393 patent in 1994 from its then-employee, Michael Kulakowski, who had been employed by Unocal and who learned of the patent’s issuance in a 1994 conversation with a Unocal employee. (Kulakowski, Tr. 4513-4514). Chevron learned of then patent from Texaco in April 1994. (Gyorfi, Tr. 5258).
2545. A few lower level Exxon employees became aware of the Unocal patent in May 1994, three months after the Unocal patent issued, but this information was never communicated to Exxon refinery management. (Eizember, Tr. 3250-3251).

**a. Chevron and Texaco Investigated the Unocal Patent.**

2546. When Texaco became aware of the Unocal patent, the first thing that Texaco managers did was try to assess the impact of the patents on Texaco’s business. (CX 7048 (Hancock, Dep. at 272-273) (to “simply know the existence of a patent does not address the fundamental questions of what does the patent mean, what does it cover, what impact

does it have on our business.”)). It took a “considerable amount of time to go through that process to understand what ‘393 really meant,” particularly because the Unocal ‘393 patent as issued had 221 claims rather than the final undisclosed 41. (CX 7048 (Hancock, Dep. at 272-273)).

2547. After learning of the Unocal patent, Chevron began to do a legal analysis of the patent, and had both inside and outside counsel review the patent. (Gyorfi, Tr. 5259). Because of the complexity of the patent, it took some time for Chevron’s counsel to complete its analysis and to try to understand the patent’s impact. (Gyorfi, Tr. 5259).

**b. Chevron and Texaco Sought to Learn Unocal’s Intentions, but Unocal Refused to Discuss the Patent.**

2548. After Chevron and Texaco completed their reviews of the patent, Chevron and Texaco each contacted Unocal to find out what Unocal’s intentions were. Texaco asked Unocal what Unocal’s intentions were for the patent, but Unocal did not make its intentions clear until Unocal released a public announcement on January 31, 1995. (CX 7048 (Hancock, Dep. at 273)).

2549. Ken Derr, Chevron’s Chairman of the Board and Chief Executive Officer during 1995, personally directed the efforts to learn Unocal’s intentions. After finding out about Unocal’s patent in late 1994, Mr. Derr had Chevron’s in-house counsel call Unocal’s in-house counsel to find out Unocal’s intentions regarding its patent. (Derr, Tr. 5097; CX 369 at 001). Unocal’s in-house counsel declined to give Chevron any information on Unocal’s intentions. (Derr, Tr. 5098; CX 369 at 001).

2550. Following this refusal, Mr. Derr then wrote a letter to Roger Beach, Unocal’s Chief Executive Officer at the time, asking him what Unocal’s intentions were regarding its patent. (Derr, Tr. 5098; CX 369; Beach, Tr. 1688). In his letter, Mr. Derr reminded Mr. Beach that the refining companies had “worked openly and cooperatively with the California Air Resources Board to develop regulations that would serve the public interest.” (CX 369 at 001). Mr. Derr also wrote: “After working together with the industry and CARB to develop specifications for reformulated gasoline, it is difficult for me to understand how Unocal can now claim by this patent that reformulated gasoline as mandated by the federal and State of California governments is a Unocal development.” (CX 369 at 001).

2551. After noting that Unocal was well aware of the investments Chevron and the other refiners had made to be able to produce CARB RFG, Mr. Derr stated that he was “relying on Unocal’s silence while the industry is moving forward as confirmation that Unocal will not use its patents to disadvantage the public or the industry.” (CX 369 at 002).

2552. Alfred DeCrane, Chairman and Chief Executive Officer of Texaco, wrote a similar letter to Mr. Beach on January 9, 1995. (CX 370; Beach, Tr. 1688-1689). Mr. DeCrane wrote that it had come to his attention that Unocal had obtained the '393 patent "with claims covering reformulated gasoline meeting the phase 2 CARB standards which go into effect March 1, 1996." (CX 370 (1/1/95 letter from DeCrane to Beach)).
2553. Mr. DeCrane explained to Mr. Beach the major financial investment that Texaco had and would continue to undertake in order to comply with CARB Phase 2 regulations. (CX 370 (1/1/95 letter from DeCrane to Beach)).
2554. Mr. DeCrane also cited ARCO's dedication of its EC research to the public. (CX 370 (1/1/95 letter from DeCrane to Beach)). Mr. DeCrane stated that Texaco would take Unocal's silence to mean that Unocal would try to enforce Unocal's patent. (CX 370 (1/9/95 letter from DeCrane to Beach)).
2555. On January 9, 1995, the same day that Texaco's Chief Executive Officer wrote to inquire about Unocal's plans to enforce the '393 patent, Mr. Wirzbicki wrote Dennis Lamb, Unocal's Head of Regulatory Affairs, to provide Mr. Lamb with materials on patent royalty rates. (CX 677 (1/9/95 memo from Wirzbicki to Lamb)).
2556. Three or four weeks later, Mr. Beach responded to Texaco with a letter making it clear that Unocal intended to monetize its patent. (Derr, Tr. 5098-5099; CX 374 at 002; Beach, Tr. 1689).
2557. Chevron CEO Mr. Derr was surprised at Unocal's response: "I felt that the action of Unocal in attempting to apply for patents and then enforce them in an environment in which the industry had been working together in a cooperative program with both the automobile industry and with CARB, that it was completely inappropriate for a company to attempt to obtain patents." (Derr, Tr. 5099, 5101).
2558. Chevron CEO Mr. Derr felt that Unocal's conduct "was one of the most unethical examples of business conduct that [Mr. Derr] had seen in [his] 40 years" in the oil industry. (Derr, Tr. 5113-5116). Mr. Derr told two outside directors of Unocal that he believed Unocal had committed unethical conduct regarding its decision to monetize its RFG patents. (Derr, Tr. 5117-5118). It was extremely unusual for Mr. Derr to express his opinions to outside directions of another company, but he "felt so strongly about the issue," that he felt he needed to inform Unocal's directors. (Derr, Tr. 5120).
2559. By the time Chevron learned that the Unocal patent existed, it was too late to change Chevron's investment plans. Chevron could not have ordered new equipment or obtained an air permit amendment in sufficient time to complete the Phase 2 projects. (Gyorfi, Tr. 5239). Likewise, by the time that Chevron learned about the Unocal patent's existence, Chevron's plants were already under construction and nearing completion and it would

have been impossible to make any significant modifications and still achieve the compliance deadline. (Gyorfi, Tr. 5240).

2560. By the time that Chevron learned about Unocal's intention to enforce the patent in 1995, construction was far along on most projects at both refineries. (CX 5010 at 003, 004).
2561. It would have been premature for Chevron to go to CARB about the Unocal patent in 1994 because of the complexity of the patent claims. Chevron did not know whether Unocal was planning to enforce the Unocal patent, whether Unocal was going to charge a licensing fee, or what that licensing fee might be. Chevron did not know the implications of the patent, and therefore had no basis to go to CARB. (Gyorfi, Tr. 5305-5306).
2562. By the time Texaco learned of the Unocal patents, it was too late for Texaco management to change Texaco's refinery modification plans. Texaco had begun reconfiguring the Texaco Los Angeles Refinery for CARB Phase 2 shortly after the regulation was issued in November of 1991. By late 1993, the Los Angeles Refinery was locking in to these modifications. (CX 7048 (Hancock, Dep. at 276)).
2563. By the time Texaco became aware of Unocal's intentions to enforce the Unocal patent, Bakersfield, too, was already "locked in" to changes. (CX 7048 (Hancock, Dep. at 273)).

**2. Exxon Lower Level Employees Learned of the Patent in May 1994, But Never Informed Management.**

2564. Exxon refinery management first learned of the Unocal patent in February 1995. (Eizember, Tr. 3206). Certain Exxon employees had become aware of the Unocal patent in May 1994, three months after it issued, but this information was never communicated to Exxon refinery management. (Eizember, Tr. 3250-3251).
2565. In January of 1995, just prior to the time that Exxon refinery management learned of the Unocal patent, 91 percent of the detailed engineering had been completed for the Phase 2 modifications at Exxon's Benicia refinery. (Eizember, Tr. 3134; CX 5068 at 004).
2566. In January 1995, just prior to the time that Exxon refinery management learned of the Unocal patent, 94 percent of the overall procurement had been completed for the Benicia Phase 2 modifications. (Eizember, Tr. 3134; CX 5068 at 004).
2567. By February 1995, just as Exxon refinery management learned of the patent, Exxon had committed approximately \$125 million to the Benicia Phase 2 project. (CX 980 at 005; Eizember, Tr. 3130). The term "committed," in Exxon's parlance, meant either spent or had become obligated to spend. (Eizember, Tr. 3129-3130).

**3. Most Refiners Learned about the Unocal Patent from Unocal's Press Release.**

2568. ARCO learned of the Unocal patent through Unocal's press release in January 1995. (Hoffman, Tr. 4934). ARCO immediately began an analysis of how the patent might affect blending ability, but "it was difficult" for ARCO to understand the impact. (Hoffman, Tr. 4936).
2569. By the time it learned of the Unocal patent, ARCO was "fully committed from a capital standpoint" and already had begun construction of equipment to meet the CARB specifications at the field of the Carson refinery. "There was a decision not to do anything about the project at the time." (Hoffman, Tr. 4936).
2570. Shell first learned of the Unocal '393 patent through an issue of the industry publication Platt's Oilgram on January 31, 1995. (CX 7052 (Jacobson, Dep. at 23); Banducci, Tr. 3484). No one from Exxon, Texaco or the WSPA trade association informed Shell about the patents. (CX 7052 (Jacobson, Dep. at 29-30)).
2571. By the time Shell learned about the Unocal patent on January 31, 1995, it had spent approximately \$600 million in capital in the Phase A project at the Martinez facility, and about \$300 million in Phase B of the project. (Banducci, Tr. 3513-3514).
2572. As of January 31, 1995, Shell was spending approximately a million dollars and engaging approximately 2500 people a day to work on the Shell Phase 2 modification projects. Not all of these people were Shell employees; most of them were contractors. (Banducci, Tr. 3514).
2573. There would have been severe consequences for Shell had it stopped or abandoned the Martinez refinery modification project on January 31, 1995. These consequences would have included the loss of \$300 million in capital expended for the phase B and residue reduction facilities, and the loss of 2500 construction workers going off to seek other sources of employment. Additionally, the facilities at Martinez were still incomplete and lacked any practical or functional value. (Banducci, Tr. 3514-3515).

**F. CARB Learned of the Patent for the First Time From the Unocal Press Release and CARB Management Was Taken by Surprise and Felt That Unocal Misled CARB.**

2574. Unocal's January 31, 1995 press release stated that the '393 patent covers "reformulated gasolines that meet 1996 California state standards for reduced emissions," and that the patent "covers many of the possible fuel compositions that refiners would find practical to manufacture and still comply with the strict California Air Resources Board (CARB) Phase 2 requirements in 1996." (CX 375 (Unocal News Release, Jan. 31, 1995, "Unocal Awarded Patent for Reformulated Gasolines; Plans to License Patent"))).

2575. Peter Venturini, lead manager of Phase 2, had personally received the Unocal press release of January 31, 1995, announcing its '393 patent. (CX 375; Venturini, Tr. 319). Before the press release Mr. Venturini had received no information from any other source suggesting that Unocal planned to charge money for its 5/14 research. (Venturini, Tr. 168).
2576. To Peter Venturini's knowledge, no other CARB staffer working on Phase 2 had learned of the Unocal patent before Unocal's January 31, 1991 press release. (Venturini, Tr. 320-322).
2577. Peter Venturini, upon learning of Unocal's patent, was shocked and surprised and felt that Unocal acted unfairly. (CX 375; Venturini, Tr. 319, 324).
2578. Unocal's January 31, 1995 press release stated that Unocal's patent will "pose no barrier to implementation of the CARB Phase 2 regulations." (CX 375).
2579. Unocal's January 31, 1995 press release stated that the patent application had been filed in December 1990, and that "[t]he U.S. Patent Office issued Unocal a patent on the fuel in February 1994." (CX 375).
2580. Unocal also said that it would offer non-discriminatory licenses to the industry. (CX 375).
2581. One reason that Peter Venturini viewed Unocal's conduct as improper was that CARB staff expected that companies participating in the Phase 1 and Phase 2 rulemakings would inform CARB of a proprietary interest in a development if they planned to charge for it and that charge had a significant cost implication. (Venturini, Tr. 189).
2582. Peter Venturini was unaware of any instance in his entire career at CARB where any company, other than Unocal, had told CARB personnel that CARB could use the company's research and then, only later, told CARB that there would be a charge for using that research. (Venturini, Tr. 191).
2583. To Robert Fletcher, a CARB supervisor in Phase 2 who had recommended using the Unocal information, Unocal's "publicly available" claim had meant that CARB could "provide any of the information associated with the research to the public, that there are no restrictions on its use, there are not caveats associated with what you can or cannot release to the public." (Fletcher, Tr. 6480).
2584. Mr. Fletcher was unaware of any restrictions on the use of Unocal's 5/14 research information after CARB received Unocal's August 17, 1991 letter, or that Unocal was reserving the right to impose cost relating to the use of the information. (Fletcher, Tr. 6472, 6476-6477; CX 24; CX 29).

2585. John Courtis found out about Unocal's patent when he received Unocal's January 1995 press release. (Courtis, Tr. 5747). When Mr. Courtis used Unocal's information in 1991 in the Phase 2 Technical Support Document, he had no clue that anything he used would put any company in a position to have to pay money to Unocal for claims on a patent. (Courtis, Tr. 5750-5751).
2586. Mr. Courtis did not know about Unocal's plan to charge money for infringement of its patent until he received Unocal's January 1995 press release. (Courtis, Tr. 5749).
2587. John Courtis, before leaving CARB in 1998, John Courtis told Dennis Lamb of Unocal that Courtis "felt deceived" because of the information that "was not provided to us." Mr. Courtis recalls that Mr. Lamb's response was that it was "a business management decision." (Courtis Tr. 5770-5771, 5784-5785, 5960).
2588. Michael Kenny, CARB's General Counsel, also was surprised upon learning of Unocal's '393 patent. (Kenny Tr. 6538). Mr. Kenny at trial recalled that CARB had received a "heads up" about a Unocal patent issue from a refiner, but no more than a couple of weeks before the January 31, 1995 press release. Unocal itself gave CARB no prior notice of any kind before January 31, 1995. (Kenny Tr. 6589-6590; 6671; Venturini Tr. 168).
2589. CARB Executive Officer James Boyd first learned of Unocal's patent on January 31, 1995 upon the arrival of the Unocal press release. (Boyd, Tr. 6729- 6730; CX 375).
2590. CARB Executive Officer Boyd, although at first reacting to Unocal's patent announcement in January 1995 with bemused disbelief, later became "extremely concerned" as he learned more about the facts. In March 1995 he was "terrified" at the potential effects on the rollout of Phase 2. Mr. Boyd's view is that Unocal "misled" CARB. (Boyd, Tr. 6730-6736).

## **XX. Unocal Met With CARB Following the Public Announcement of the '393 Patent, But Continued Unocal's Deceptive Scheme.**

### **A. Unocal Met with CARB Staff on March 17, 1995.**

2591. On February 17, 1995, CARB's Executive Officer James Boyd sent a letter to Roger Beach of Unocal requesting that Unocal provide information to CARB concerning its '393 patent. (CX 47).
2592. Mr. Boyd requested a meeting with Unocal "to discuss the impact of Unocal's RFG patent on the California's clean fuels regulations." (CX 47). In his letter, Mr. Boyd recognized that Unocal's patent "introduces a new and important element into the state's plans for RFG." (CX 47). To assess the situation, CARB needed to know more about

- “Unocal’s plans concerning the marketing of [Unocal’s] RFG patent” and “the extent of the patent’s 155 claims.” (CX 47).
2593. Internally, Unocal dismissed CARB’s request as “bureaucratic gamesmanship.” (CX 396).
2594. Unocal representatives met with CARB staff at CARB’s offices on March 17, 1995. Peter Venturini, Executive Officer James Boyd and General Counsel staff Tom Jennings were among the attendees for CARB. Roger Beach, Dennis Lamb, 76 Products President Lawrence Higby was among the attendees for Unocal. (Venturini, Tr. 168-169; Boyd, Tr. 6734-6735; Beach, Tr. 1727; Lamb, Tr. 1924; CX 48).
2595. Peter Venturini at the time of the March 17, 1995 meeting believed that Unocal had misled CARB staff. (Venturini, Tr. 169, 171).
2596. Executive Officer Boyd recalled that, at the March 17, 1995 meeting, he “expressed some concern, a deep concern about the ramifications this could have on the regulation and the tremendous effort that had gone into the regulation and the huge investment that had been made in California to comply with the regulation.. He also recalled “expressing in effect disappointment with Unocal.” (Boyd, Tr. 6732-6734, 6736).
2597. Executive Officer James Boyd at the March 17, 1995 meeting expressed concern to Roger Beach of Unocal about the patent’s potential threat to the viability of the Phase 2 regulation. Mr. Boyd was “rather terrified over the potential ramifications,” having already had meetings with the attorney general’s office and others who had advice on patent law. Mr Boyd had “extreme concern for the ramifications on the regulation, the viability of the regulation, due to the cost impacts that were implied.” (Boyd, Tr. 6733-6734) .
2598. General Counsel Michael Kenny also recalled that at the March 17, 1995 meeting with Unocal, CARB representatives expressed dissatisfaction with Unocal’s conduct. (Kenny, Tr. 6539).
2599. Executive Officer James Boyd upon learning about the patent and meeting with Unocal on March 17, 1995, had specific concerns an impact of Unocal royalties on the cost of the product to refiners which would be passed on to the California consumer, which would then have an impact on the state of California’s economy.” (Boyd, Tr. 6733-6734).
2600. One reason for Executive Officer Boyd’s deep concern was the sheer size of potential royalties. In Mr. Boyd’s words, “believe me, in those days, a nickel increase in the cost of a gallon of gasoline in California would have extreme negative consequences.” (Boyd, Tr. 6734).

2601. Dennis Lamb remembered that CARB representatives at the March 17, 1995 meeting expressed concern about the potential impact on supply of the Unocal patent. (Lamb, Tr. 2046-2047).

**B. Unocal Met with Governor Wilson in March 1995.**

2602. In a February 1995 memorandum to Roger Beach, Dennis Lamb and John Rafuse urged Beach to “meet with Governor Wilson as soon as possible.” (CX 384 at 001; Beach, Tr. 1719-1720). The message they wanted Mr. Beach to convey was that the Governor should “let the oil companies fight this out; don’t try a political or regulatory ‘fix.’” (CX 384 at 002; Beach, Tr. 1721).

2603. A list of key talking points given to Roger Beach before his meeting with Governor Wilson states that Unocal would “make licenses available at a reasonable fee to every oil supplier.” (CX 401 at 004; *see also* CX 383).

2604. In a list of key talking points given to Roger Beach before his meeting with Governor Wilson, Unocal admits that it “freely shared its research data with CARB, which used the data in formulating its regulations.” (CX 401 at 004; *see also* CX 383).

2605. At or about the time of that March 17, 1995 meeting CARB also received a copy of a letter from Roger Beach of Unocal to Governor Wilson, dated March 17, 1995. (CX 48 at 003-004; Boyd, Tr. 6734-6735).

2606. The March 17, 1995 letter from Unocal sought to reassure Governor Wilson and CARB that Unocal did not intend to file any injunctions or charge prices to interfere with Phase 2. The letter stated, among other things:

You expressed concern that Unocal would initiate a preliminary injunction to stop production of patented fuels by any infringing company that did not honor our patent and licensing agreements. The result of such action, you said, could jeopardize a delicate supply-demand balance at the time of CARB RFG introduction, and thus threaten the economy of the state. At that time I assured you that we would not seek any injunctive relief that will interfere with the introduction of CARB RFG in 1996. We are a century-old California company and would never undertake to damage the State’s economy . . . I want to reaffirm the commitments we discussed at our meeting . . . Unocal will make the same commitments in meetings with other appropriate officials of your Administration.”

(CX 48 at 003).

2607. Unocal representatives did not tell CARB at a March 17, 1995 meeting that Unocal intended to file a second patent a week later, on March 25, 1995. (Boyd, Tr. 6740-6741).
2608. In materials prepared for its meeting with CARB, Unocal showed concern that CARB would force Unocal “to give free licenses to others.” (CX 403 at 002).
2609. At the meeting, however, Unocal did not inform CARB of the royalties it was considering for the Unocal RFG patent. (Beach, Tr. 1728-1729). Nor did Unocal inform CARB that the company was going to file for additional RFG patents. (Beach, Tr. 1729). No one at the meeting gave to CARB any information regarding the extent of the patent claims. (Beach, Tr. 1729). In fact, Mr. Beach was not aware of anyone at Unocal who informed CARB of the extent of the patent claims. (Beach, Tr. 1730).
2610. CARB officials at the March 17, 1995 meeting definitely would have been interested in knowing about Unocal’s intent to file a patent a week later, on March 25, 1995. (Boyd, Tr. 6740).
2611. Unocal, to Lamb’s knowledge, never gave CARB a “heads-up” on any of the five patent applications. (Lamb, Tr. 2354-2356).
2612. Lamb does not recall any discussion with CARB in April 1995 that Unocal had filed a second patent application based on its 5/14 research. (Lamb, Tr. 2047)
2613. Unocal decided not to inform CARB of any “future moves regarding the whole patent issue.” (Beach, Tr. 1731-32; CX 410).
2614. Unocal never informed CARB of Unocal’s intent to charge license fees or royalties for any of the four RFG patents that were filed after the ‘393 patent. (Boyd, Tr. 6741; Lamb, Tr. 1823).
2615. Unocal had never, up through the time of trial in 2004, told CARB staff that it had obtained a patent on the very concept of using mathematical equations to predict emissions from gasoline. (Venturini, Tr. 199-200).
2616. Unocal, contrary to the statements in the Governor Wilson letter, did request injunctive relief during the subsequent patent litigation. (CX 869 at 010; CX 1323 at 118-119).
2617. Unocal in the subsequent patent litigation sought 7.5 cents per gallon from six refiners and was awarded 5.75 cents per gallon. Unocal also is seeking 5.75 cents per gallon, trebled, from Valero. (CX 1337 at 011).
2618. After the jury verdict in the ‘393 litigation, Unocal sought to assure Governor Wilson that the “jury award and subsequent licensing fees should not have a significant impact

on consumer prices.” (CX 905). Unocal stressed to the Governor that the 5.75 cents/gallon jury award only applied to a five month period. (CX 905). But Unocal did not tell Governor Wilson that it was going to attempt to collect 5.75 cent/gallon damages from the end of that five-month period to the time the patent expires. (Beach, Tr. 1726).

**C. Unocal Promised Not to Charge Royalties for CARB’s Test Batches.**

2619. One of CARB’s immediate concerns upon learning of the Unocal patent was how the patent might impact CARB’s testing program. Phillips was to manufacture 600,000 gallons of fuel that complied with the CARB Phase 2 rule. (CX 50; Boyd, Tr. 6738-7839).
2620. According to Executive Officer Boyd, CARB staff “suddenly became concerned” that “this test process might be in jeopardy, further complicating and jeopardizing the implementation of the regulation.” (Boyd, Tr. 6738-6739).
2621. Executive Officer Boyd sent a letter to Unocal on or about April 13, 1995 seeking to resolve the fuel testing issue. (CX 50; Boyd, Tr. 6738-6739).
2622. Unocal sent a letter on April 10, 1995 to Mr. Boyd agreeing not take action with respect to this test fuel. Dennis Codon of Unocal wrote that “Unocal will not seek an injunction against infringement of its patent against the producer or users of the test program fuel for the announced amount of the 600,000 gallons or to collect monetary damages in the same of this amount.” (CX 49).
2623. Unocal in its letter to CARB on April 10, 1995 stated that “Unocal will seek to license companies that wish to make its patented fuels.” (CX 49).
2624. CARB Executive Officer Boyd, though pleased that this specific threat to the testing program was removed, by Unocal’s April 10, 1995 letter still viewed the Unocal patent as a potential threat to the regulation. (Boyd, Tr. 6739-6749).

**D. Unocal Met with CARB Staff on April 25, 1995.**

2625. Even after meeting with CARB regarding its first RFG patent, Unocal never informed CARB that Unocal was seeking additional RFG patents. Rather, Unocal made a specific decision to keep its other patent applications secret. (Beach, Tr. 1730).
2626. Unocal did, however, recognize “the potential dilemma we have with CARB by not informing them of future moves regarding the whole Patent issue.” (CX 410 at 001). Internally, Unocal discussed the possibility of briefing CARB “in advance of any future developments in regard to our Patent situation so they are not blind sided.” (CX 410 at 001). But Unocal decided not to brief CARB in advance of any future developments. (Beach, Tr. 1731-1732).

2627. On April 24, 1995 Unocal representatives met again with CARB officials. (CX 1060 at 003; Lamb, Tr. 2045-2046). This meeting took place after the meeting where Unocal first talked with CARB about the '393 patent after the public announcement of the '393 patent. (Lamb, Tr. 2046).
2628. Mr. Lamb participated in the meeting with CARB on April 25, 1995, and his participation is reflected by his handwritten signature on the sign-in sheet for this meeting. (CX 1060 at 003; Lamb, Tr. 2046).
2629. Prior to the April 24, 1995 meeting with CARB, Mr. Lamb had attended an internal Unocal meeting on April 13, 1995 where Greg Wirzbicki, Unocal's Chief Patent Counsel, had discussed the second patent. (See CX 1645; Lamb, Tr. 2047-2048). But Lamb did not discuss the filing of a second patent application based on the 5/14 research results with CARB at the April 24, 1995 meeting. (Lamb, Tr. 2047).

## **XXI. Unocal Continued to Expand the Scope of Its Patents After CARB's Adoption of the Phase 2 Regulations.**

### **A. Unocal Filed New Patent Applications.**

#### **1. Unocal Management Made a Conscious Decision Not to Disclose Any of Its Continuation Patent Applications to CARB.**

2630. Roger Beach admitted in his 1996 deposition that there were within Unocal discussions about whether to disclose the existence of Unocal's patent application to CARB. (Beach, Tr. 1660-1662). Mr. Beach admitted at trial that he could no longer remember these discussions. (Beach, Tr. 1662-1663).
2631. Mr. Beach was given the opportunity to read and make any changes or corrections to his 1996 deposition testimony. (Beach, Tr. 1701-1702). In fact, Mr. Beach signed an acknowledgment that he had "read the foregoing deposition and having made such changes and corrections as I desire." (Beach, Tr. 1702).
2632. Even after meeting with CARB regarding its first RFG patent, Unocal never informed CARB that Unocal was seeking additional RFG patents. Rather, Unocal made a specific decision to keep its other patent applications secret. (Beach, Tr. 1730).
2633. Unocal did, however, recognize "the potential dilemma we have with CARB by not informing them of future moves regarding the whole Patent issue." (CX 410 at 001). Internally, Unocal discussed the possibility of briefing CARB "in advance of any future developments in regard to our Patent situation so they are not blindsided." (CX 410 at 001). But Unocal decided not to brief CARB in advance of any future developments. (Beach, Tr. 1732).

2634. Throughout the CARB Phase 2 rulemaking proceedings, Unocal concealed from CARB (and everyone else outside of Unocal) that Unocal had filed a patent application covering the results of the 5/14 project or that Unocal, upon the issuance of any patents, intended to enforce its patents rights and seek royalties thereunder. (Venturini, Tr. 210-259, CX 22; CX 23).
2635. In Unocal's own Q-and-A FAQ sheet, the prepared answer to a question regarding CARB's knowledge of Unocal's filed patent application was, "The patent office keeps applications secret to protect the inventor and the intellectual property...CARB would not have been aware of our pending patent application." (CX 462 at 004; CX 599 at 012).

## **2. Unocal Began Filing for Additional RFG Patents in June 1993.**

2636. On June 14, 1993, Unocal filed an a second patent application, No. 08/772,243 on Dr. Jessup and Dr. Croudace's reformulated gasoline invention. (CX 1790 at 001-006, 009-070; Wirzbicki, Tr. 992-993).
2637. The second application was a "divisional" application, (CX 1790 at 003; Wirzbicki, Tr. 992-993), and was based on the same invention that the '393 patent was based upon. (Wirzbicki, Tr. 994).
2638. Like all of the other five patents that Unocal eventually obtained on Dr. Jessup and Croudace's invention, the disclosure of the patent application was the same as that in the '393 patent, except for "minor" correction amendments. (CX 617, CX 618, CX 619, CX 620, CX 621; Wirzbicki, Tr. 994-995).
2639. The June 13, 1993 divisional application, together with a continuation of that application, ultimately resulted in the issuance of U.S. Patent No. 5,593,567 on January 14, 1997. (Wirzbicki, Tr. 992-994; CX 618 at 001).
2640. While the patent applications that lead to the '567 patent were pending, the Patent Office did not publish patent applications. (Linck, Tr. 7842-7843).
2641. The June 14, 1993 preliminary amendment filed by Mr. Wirzbicki, limited the claims in the divisional patent application to those directed to a "method for reducing the amount of pollutant(s) . . ." by using gasoline similar to the gasoline claimed in the '393 patent. (CX 1790 at 083-099, remarks at 091; Wirzbicki, Tr. 994-995).
2642. As Mr. Wirzbicki explained to the patent office in the June 1993 preliminary amendment, "The fuel compositions recited in present claims 83 to 92 find exact correspondence (i.e., their scope is identical insofar as the fuel composition requirements are concerned) with an allowed claim" of the application that lead to the '393 patent. (CX 1790 at 083-087 (claims), CX 1790 at 091 (remarks)).

2643. After receiving an initial rejection from the patent examiner (CX 1790 at 100-104), Mr. Wirzbicki in April 1994 filed an information disclosure statement, IDS No. 3, and an accompanying amendment. (CX 1790 at 122-334, 363-457 (IDS No. 3), CX 1790 at 337-362 (amendment); CX 1790 at 123 (remarks re accompanying amendment)).

2644. Mr. Wirzbicki explained to the patent examiner in IDS No. 3 that,

“Through the accompanying amendment the broadest claims are directed to methods involving an unleaded gasoline fuel suitable for combustion in an automotive engine, which fuel in the broadest embodiment (claims 83 and 106) has the following properties:

(1) a Reid Vapor Pressure (RVP) less than 7.0 psi.

(2) a T50 no greater than 210° F.

(3) a T90 less than 300° F.

(4) an olefin content less than 10 volume percent

(5) an octane value of 87+.

(CX 1790 at 123-124; Wirzbicki, Tr. 992, 996-997) (emphasis in original).

2645. Mr. Wirzbicki admitted in IDS No. 3, filed in April 1994, that, “As the Examiner can see from Attachment B, the properties of the inventive fuel are virtually identical to some of the requirements specified for Phase 2 gasolines to be sold in California starting in March 1996.” (CX 1790 at 124; Wirzbicki, Tr. 992, 996-998).

2646. The Attachment B Mr. Wirzbicki referred to in IDS No. 3 was an “Octane Week” publication that included the specifications for the CARB Phase 2 regulations, including flat, averaging and cap limits. (Wirzbicki, Tr. 992, 996-999; CX 1791 at 171).

2647. The Attachment B shows that the “inventive fuel” claims pending in Unocal’s divisional application in April 1994 covered essentially all of the gasoline to be required under the CARB Phase 2 flat and averaging limits, and most of the gasoline to be required under the caps. (CX 1790 at 123-124; CX 1791 at 171).

2648. The “Octane Week” Attachment B stated that the CARB Phase 2 regulations specified maximum limits as follows:

Parameter	Producer Limit [flat]	Averaging Limit	Limit - All Gasoline
Volatility (psi) [RVP]	7.0	--	7.0
Sulfur (ppm)	40	30	80

Total Aromatics (vol%)	25	22	30
Benzene (vol%)	1.00	0.80	1.20
Olefins (vol%)	6.0	4.0	10.0
Oxygen (wt%)	1.8 - 2.2	--	2.7 (max) 1.8 (min)
T90 (°F)	300	290	330
T50 (°F)	210	200	220

(CX 1791 at 171; Wirzbicki, Tr. 999-1001 (An octane level of greater than 87 is typical for regular unleaded gasoline)).

2649. Mr. Wirzbicki, was referring to the 7 psi RVP, 210°F T50, 300°F T90 and 10 volume percent olefins when he stated in IDS No. 3 that the properties of the fuel in the patent application were “virtually identical” to the CARB Phase 2 regulations. (Wirzbicki, Tr. 992, 996-1001).
2650. When Mr. Wirzbicki wrote the statement referenced above in IDS No. 3, Mr. Wirzbicki believed that it was correct. (Wirzbicki, Tr. 998). Mr. Wirzbicki signed the IDS. No. 3 in April 1994. (Wirzbicki, Tr. 992, 996; CX 1790 at 132).
2651. Similarly, on October 26, 1994, Mr. Wirzbicki filed an amendment to the pending divisional patent application. (CX 1791 at 055-131).
2652. In remarks accompanying the October 1994 amendment, Mr. Wirzbicki stated that, “California, having been through a ‘Phase 1’ process, is soon to initiate a Phase 2, in which gasolines of reduced RVP, T50, etc., (which, for the most part, if not exclusively, fall within the scope of the compositions required by the claims of the present invention) will be mandated.” (CX 1791 at 082; Wirzbicki, Tr. 1001-1002).
2653. Mr. Wirzbicki thus understood and represented to the PTO that even though the claims pending in the divisional patent application covered methods of using reformulated gasoline to reduce pollution (rather than covering just the gasoline itself), the claims still would cover almost all, if not all, of the gasoline that would comply with the CARB Phase 2 regulations. (CX 1791 at 082; Wirzbicki, Tr. 1001-1002).

**3. Unocal Eventually Obtained Four Additional RFG Patents Based on the Original Patent Application.**

- a. Unocal Obtained its ‘567 Patent on January 14, 1997, Which Covers Use of Many of the Gasolines Required to Be Made Under the CARB Phase 2 Regulations.**

2654. Unocal obtained U.S. Patent No. 5,593,567 on January 14, 1997, from the division application it filed in June 1993 and its continuation. (CX 618 at 001; CX 7001).
2655. The issued claims in the '567 patent can be summarized as covering methods of driving a vehicle with a catalytic converter to reduce emissions (compared to the emissions that would have been produced by a normal fuel), by burning reformulated gasoline in the vehicle. (CX 618 at 027-028).
2656. For example, claim 6 of the '567 patent claims:

“A method for operating an automotive vehicle having a spark-induced, internal combustion engine and a catalytic converter to yield a reduced amount of NO<sub>x</sub>, CO, or unburned hydrocarbons as compared to combusting fuel A/O AVE in said engine, the method comprising:

(1) introducing into the engine an unleaded gasoline, suitable for combustion in an automotive engine, having the following properties:

- (a) a Reid Vapor Pressure less than 7.5 psi;
- (b) a 10% D-86 distillation point no greater than 158° F.;
- (c) a 50% D-86 distillation point less than 208° F.;
- (d) a 90% D-86 distillation point no greater than 315° F.;
- (e) a paraffin content greater than 72 volume percent;
- (f) an olefin content less than 8 volume percent;
- (g) an aromatics content of at least 4.5 volume percent; and
- (h) an octane value of at least 87; and thereafter

(2) combusting the unleaded gasoline in said engine;

(3) introducing at least some of the resultant engine exhaust emissions into the catalytic converter; and

(4) discharging emissions from the catalytic converter to the atmosphere.”

(CX 618 at 027).

2657. The gasoline property limits required by claim 6 in the '567 patent substantially cover the gasolines required to be produced under the limits of the CARB Phase 2 regulation:

Parameter	Claim 6	Flat Limit	Averaging Limit	Cap Limit
RVP	<7.5	7.0	--	7.0
Aromatics	≥4.5	25	22	30
Olefins	<8	6.0	4.0	10.0
T90 (°F)	≤315	300	290	330
T50 (°F)	<208	210	200	220

(CX 1791 at 171; CX 618 at 027).

2658. In addition, as discussed in greater detail below, U.S. refiners who produce gasoline know that the vast majority of automobiles on the road today run in accordance with the remaining limitations in claim 6 of the '567 patent.

2659. Unocal has not disclaimed any claims of the '567 patent. (Wirzbicki, Tr. 1020).

**b. Unocal Obtained Its '866 Patent on August 5, 1997, Which Covers Use of Many of the Gasolines Required to Be Made Under the CARB Phase 2 Regulations.**

2660. Unocal's Chief Patent Counsel, Mr. Wirzbicki, filed a continuation patent application on June 5, 1995 based on Unocal's initial 1990 patent application for Dr. Jessup's and Dr. Croudace's invention. The June 5, 1995 application lead to the issuance of Unocal's third reformulated gasoline patent, U.S. Patent No. 5,653,866 on Aug. 5, 1997. (CX 1794 at 002-066; CX 1795; CX 619).

2661. Unocal's '866 patent can be generally summarized as claiming (1) methods of operating a vehicle using gasoline with particular properties to yield reduced amount of pollutants, and (2) methods of minimizing air pollution caused by automobile exhaust emissions in various geographical areas by delivering large volumes of reformulated gasoline to service stations in those areas. (CX 619 at 027-028).

2662. For example, claim 1 of Unocal's '866 patent claims:

“A method for operating an automotive vehicle having a spark-induced, internal combustion engine and a catalytic converter to yield a reduced amount of NOx, CO, or

unburned hydrocarbons as compared to combusting fuel A/O AVE in said engine, the method comprising:

(1) introducing into the engine an unleaded gasoline, suitable for combustion in an automotive engine, having a Reid Vapor Pressure less than 7.5 psi, an octane value of at least 87, a 10% D-86 distillation point no greater than 158° F, a 50% D-86 distillation no greater than 210° F, and an olefin content less than 10 volume percent; and thereafter

(2) combusting the unleaded gasoline in said engine;

(3) introducing at least some of the resultant engine exhaust emissions into the catalytic converter; and

(4) discharging emissions from the catalytic converter to the atmosphere.”

(CX 619 at 027).

2663. The method limitations of claim 1 of the ‘866 patent are identical to those of claim 6 of the ‘567 patent. (CX 619 at 027; CX 618 at 027). The only difference between the claims is in a few of the property values of the gasoline. (CX 619 at 027; CX 618 at 027).

2664. The gasoline property limits required by claim 1 in the ‘866 patent cover the gasolines required to be produced under the limits of the CARB Phase 2 regulation:

Parameter	Claim 1	Flat Limit	Averaging Limit	Cap Limit
RVP	<7.5	7.0	--	7.0
Olefins	<10	6.0	4.0	10.0
T50 (°F)	≤210	210	200	220

(CX 1791 at 171; CX 619 at 027).

2665. As discussed in greater detail below, U.S. refiners who produce gasoline know that the vast majority of automobiles on the road today run in accordance with the remaining limitations in claim 1 of the '866 patent.

2666. Unocal has not disclaimed any claims of the '866 patent. (Wirzbicki, Tr. 1020).

**c. Unocal Obtained its '126 Patent on November 17, 1998, Which Covers Many of the Gasolines Required to be Made Under the CARB Phase 2 Regulations, and Methods of Making and Delivering Them to Service Stations.**

2667. Unocal's fourth reformulated gasoline patent, U.S. Patent No. 5,837,126, issued on Nov. 17, 1998. (CX 620 at 001).

2668. The '126 patent issued from another continuation application that Unocal's Chief Patent Counsel, Mr. Wirzbicki, filed on August 1, 1997. (CX 1796 at 033-100; CX 7001).

2669. The '126 patent contains two types of patent claims: claim to gasoline compositions and claims to methods. (CX 620 at 027-028; Wirzbicki, Tr. 1021-1022).

2670. The composition claims of the '126 patent are the same as those in the '393 patent except for the specific sub-combinations of gasoline property requirements in the claims. (RX 1165A at 015).

2671. For example, claim 2 of the '126 patent claims:

“An unleaded gasoline, suitable for combustion in an automotive engine, having the following properties:

- (a) a Reid Vapor Pressure less than 7.5 psi;
- (b) a 10% D-86 distillation point no greater than 158° F;
- (c) a 50% D-86 distillation point no greater than 215° F;
- (d) a 90% D-86 distillation point no greater than 315° .;
- (e) a paraffin content greater than 75 volume percent;

- (f) an olefin content less than 8 volume percent;
- (g) an aromatics content of at least 4.5 volume percent; and
- (h) an octane value of at least 87.”

(CX 620 at 027).

2672. The gasoline property limits required by claim 2 in the ‘126 patent substantially cover the gasolines required to be produced under the limits of the CARB Phase 2 regulation:

Parameter	Claim 2	Flat Limit	Averaging Limit	Cap Limit
RVP	<7.5	7.0	--	7.0
Aromatics	≥4.5	25	22	30
Olefins	<8	6.0	4.0	10.0
T90 (°F)	≤315	300	290	330
T50 (°F)	≤215	210	200	220

(CX 1791 at 171; CX 620 at 028).

2673. The ‘126 patent also contains claims to methods of making gasoline – by blending at least two hydrocarbon-containing streams together to produce gasoline in batches of at least 50,000 gallons – and then beginning to deliver that gasoline to service stations. (CX 620 at 028).

2674. For example, claim 48 in the ‘126 patent claims:

“A method comprising:

(1) blending at least two hydrocarbon-containing streams together to produce at least 50,000 gallons of an unleaded gasoline suitable for combustion in an automotive engine and having the following properties:

- (a) a Reid Vapor Pressure less than 7.5 psi;
- (b) a 10% D-86 distillation point no greater than 158° F;
- (c) a 50% D-86 distillation point no greater than 212° F;

- (d) a 90% D-86 distillation point no greater than 315° F;
- (e) a paraffin content greater than 50 volume percent;
- (f) an olefin content less than 8 volume percent;
- (g) an aromatics content of at least 4.5 volume percent; and
- (h) an octane value of at least 87; and

(2) commencing delivery of unleaded gasoline produced in step (1) to gasoline service stations.”

(CX 620 at 028).

2675. The gasoline property limits required by claim 48 in the ‘126 patent substantially cover the gasolines required to be produced under the limits of the CARB Phase 2 regulation:

Parameter	Claim 48	Flat Limit	Averaging Limit	Cap Limit
RVP	<7.5	7.0	--	7.0
Aromatics	≥4.5	25	22	30
Olefins	<8	6.0	4.0	10.0
T90 (°F)	≤315	300	290	330
T50 (°F)	≤212	210	200	220

(CX 1791 at 171; CX 620 at 028).

2676. In addition, as discussed in greater detail below, essentially all U.S. refiners make gasoline – including CARB Phase 2 summertime gasoline -- by blending at least two hydrocarbon-containing streams together to produce gasoline in batches of at least 50,000 gallons, and then begin to deliver that gasoline to service stations.

2677. For the ‘126 patent, Unocal also filed a “terminal disclaimer,” which has the effect of disclaiming the ‘126 patent term that extends beyond the ‘393 patent term. (CX 1796 at 205-208).

2678. Unocal filed its terminal disclaimer after it had received a rejection of the composition claims pending in the application that lead to the ‘126 patent. (CX 1788 at 101-103, 105-

107, 205-207). The examiner's rejection was for obviousness-type double patenting in view of claims 1-9 of the '393 patent. (CX 1796 at 106).

2679. As the patent examiner explained, the "obviousness-type double patenting rejection" meant that although the claims pending in the '126 application were "not identical" to claims 1-9 in the '393 patent, they were not "patentably distinct" from the '393 claims. (CX 1796 at 106).
2680. The patent examiner explained that the '126 composition claims were rejected in view of claims 1-9 of the '393 patent "because the claimed unleaded gasoline compositions are not identical [sic] but overlap one another . . . ." (CX 1796 at 106). In other words, the '126 composition claims were obvious in view of the '393 compositions even though they did not have the same numerical property values.
2681. As stated by Mr. Beach in a press release, the claims of the '126 patent are, in some respects, "broader than those in the earlier patent that Unocal was granted in 1994." (CX 2115 at 001; CX 421 at 002; Beach, Tr. 1704-1705, 1706-1707). Mr. Beach recognizes that the '126 patent, "coupled with the claims of the earlier '393 patent, offer a significant potential revenue stream to Unocal." (CX 2115 at 001; CX 421 at 002; Beach, Tr. 1705-1706, 1706-1707).
2682. Unocal has not disclaimed any claims of the '126 patent. (Wirzbicki, Tr. 1020).

**d. Unocal Filed its Fifth Patent Application in 1998, and Obtained its '521 Patent on February 29, 2000.**

2683. Unocal obtained its fifth reformulated gasoline patent, U.S. Patent No. 6,030,521, on February 29, 2000. (CX 621 at 001).
2684. The '521 patent issued from a continuation patent application filed on November, 13, 1998 based on the original December 1990 patent application on Dr. Jessup's and Dr. Croudace's invention. (CX 1789 at 158-221; CX 621).
2685. The '521 patent is directed to a method of blending reformulated gasoline through the use of blending processes controlled by at least one mathematical equation that predicts emissions for the blended gasoline. (CX 621 at 027-029).
2686. For example, claim 1 of the '521 patent claims:

A process comprising blending at least two hydrocarbon streams boiling in the range of 77 °F, to about 437 °F to produce an unleaded gasoline suitable for combustion in an automotive engine, said blending being controlled in accordance with at least one mathematical equation predicting for the produced gasoline one or more pollutants selected from the group consisting of CO, NO<sub>x</sub>, and unburned hydrocarbons emitted in

the exhaust of an automobile with a catalytic converter as a function of at least two of the following properties of the produced gasoline:

- (1) the Reid Vapor Pressure;
- (2) the 10% D-86 distillation point;
- (3) the 50% D-86 distillation point;
- (4) the 90% D-86 distillation point;
- (5) the aromatics content;
- (6) the olefin content;
- (7) the paraffin content; and
- (8) the research octane number, having:
  - (a) a Reid Vapor Pressure less than 7.5 psi;
  - (b) a 10% D-86 distillation point no greater than 158° F.;
  - (c) a 50% D-86 distillation point no greater than 212° F.;
  - (d) a 90% D-86 distillation point no greater than 315° F.;
  - (e) an olefin content less than 15 volume percent;
  - (f) a paraffin content greater than 65 volume percent;
  - (g) a research octane number greater than 90; and
  - (h) an octane value of at least 87.

(CX 621 at 027).

2687. The gasoline property limits required by claim 1 in the '521 patent substantially cover the gasolines required to be produced under the limits of the CARB Phase 2 regulation:

Parameter	Claim 1	Flat Limit	Averaging Limit	Cap Limit
RVP	<7.5	7.0	--	7.0
Olefins	<15	6.0	4.0	10.0
T90 (°F)	≤315	300	290	330
T50 (°F)	≤215	210	200	220

(CX 1791 at 171; CX 621 at 027).

2688. Mr. Wirzbicki, Unocal's Chief Patent Counsel, understands that the "mathematical equation" in claim 1 of the '521 patent can be "a type of predictive model." (Wirzbicki, Tr. 1025-1028).
2689. Mr. Wirzbicki knows that "CARB has a predictive model in their regulations." (Wirzbicki, Tr. 1028).
2690. Mr. Wirzbicki also understands that the invention in the claim 1 of the '521 patent could be achieved by using a "linear model equation or program" at a refinery to produce reformulated gasoline. (Wirzbicki, Tr. 1025-1029).
2691. Unocal has not disclaimed any claims of the '521 patent. (Wirzbicki, Tr. 1020).

## **XXII. Unocal Has Enforced its RFG Patents Through Licensing and Litigation Activities.**

2692. Unocal has sought to enforce its five patents through litigation and licensing activities. (CCPF ¶¶ 2693-2757).
2693. Unocal stated that it will enforce United States Patent No. 5,288,393 (issued February 22, 1994). (Respondent Union Oil Company of California's Responses to Complaint Counsel's First Set of Requests for Admissions).
2694. Unocal stated that it will enforce United States Patent No. 5,593,567 (issued January 14, 1997). (Respondent Union Oil Company of California's Responses to Complaint Counsel's First Set of Requests for Admissions).
2695. Unocal stated that it will enforce United States Patent No. 5,653,866 (issued August 5, 1997). (Respondent Union Oil Company of California's Responses to Complaint Counsel's First Set of Requests for Admissions).
2696. Unocal stated that it will enforce United States Patent No. 5,837,126 (issued November 17, 1998). (Respondent Union Oil Company of California's Responses to Complaint Counsel's First Set of Requests for Admissions).
2697. Unocal stated that it will enforce United States Patent No. 6,030,521 (issued February 29, 2000). (Respondent Union Oil Company of California's Responses to Complaint Counsel's First Set of Requests for Admissions).

### **A. Unocal Has Enforced its Patents Through Litigation Activities.**

2698. On April 13, 1995, ARCO, Exxon, Mobil, Chevron, Texaco, and Shell filed suit in the United States District Court for the Central District of California seeking to invalidate Unocal's '393 patent. (Answer ¶ 68).

2699. Unocal issued a press release on April 28, 1995 stating that it had filed an answer and counterclaim in the litigation. (CX 599 at 004-005 (4/28/95 press release)).
2700. In the April 28, 1995 press release Unocal stated, “[W]e believe our patent is valid. In fact, the plaintiffs admitted in their lawsuit that they are infringing on our patent.” (CX 599 at 004-005).
2701. Unocal further stated in the April 28, 1995 press release that the ‘393 patent “covers many of the formulations that refiners might find practical to manufacture in order to comply with the California Air Resources Board’s (CARB) Phase 2 reformulated gasoline regulations.” (CX 599 at 004-005).
2702. Unocal filed a counterclaim in the United States District Court for the Central District of California for patent infringement of the ‘393 patent. (Answer ¶ 68).
2703. Unocal sought an injunction in the litigation against ARCO, Chevron, Exxon, Mobil, Shell, and Texaco. (CX 869 at 010; CX 1323 at 118-119).
2704. The jury in the private litigation in the United States District Court for the Central District of California determined that Unocal’s ‘393 patent was valid and infringed, and found that ARCO, Exxon, Mobil, Chevron, Texaco, and Shell must pay a royalty rate of 5.75 cents per gallon for the period from March through July 1996 for sales of infringing gasoline in California. (Answer ¶ 68).
2705. After the ‘393 trial, Unocal believed that the impact of the royalty or licensing fee would impact 100% of gasoline sold in California. In a Q&A document setting forth proposed answers to media questions, a handwritten edit modifies the proposed impact of “2 cents per gallon” with the phrase “*on all gallons sold.*” (CX 361 at 001) (emphasis added).
2706. Unocal’s CEO at the time, Mr. Beach, told Unocal’s shareholders after the jury ruling in the ‘393 litigation that Unocal expected to receive a “significant amount of money” from the litigation and was “in great shape” as “more and more gallons are sold every day.” (CX 425 at 003; Beach, Tr. 1706).
2707. After the jury verdict in the ‘393 litigation, Unocal sought to assure Governor Wilson that the “jury award and subsequent licensing fees should not have a significant impact on consumer prices.” (CX 905). Unocal stressed to the Governor that the 5.75 cent/gallon jury award only applied to a five month period. (CX 905). But Unocal did not tell Governor Wilson that it was going to attempt to collect 5.75 cent/gallon damages from the end of that five-month period to the time the patent expires. (Beach, Tr. 1726).
2708. The United States Court of Appeals for the Federal Circuit subsequently affirmed the trial court’s judgment. The United States Supreme Court denied ARCO, Exxon, Mobil,

Chevron, Texaco, and Shell's petition for a writ of certiorari. ARCO, Exxon, Mobil, Chevron, Texaco, and Shell have made payments totaling \$91 million to Unocal for damages, costs, and attorneys' fees. (Answer ¶ 69).

2709. An accounting action is still ongoing in the United States District Court for the Central District of California to determine damages for infringement of the '393 patent by ARCO, Exxon, Mobil, Chevron, Texaco, and Shell for the period from August 1, 1996, through December 31, 2000. (Answer ¶ 70).
2710. The trial judge ruled in August 2002 in the accounting of infringement of the '393 patent by the six refiners for the period from August 1, 1996, through December 31, 2000, that the royalty rate applicable to infringing gasoline produced and/or supplied in California remained 5.75 cents per gallon. (Answer ¶ 70; Teece, Tr. 7630).
2711. Unocal is now seeking between \$250 and \$280 million for infringement between July 1996 and 2000 from the four largest refiners in California in this action. (Strathman, Tr. 3659-3671).
2712. On January 23, 2002 Unocal sued Valero Energy Company in the Central District of California for willful infringement of both the '393 patent and the '126 patent. In its complaint, Unocal seeks damages at the rate of 5.75 cents per gallon for all infringing gallons, and treble damages for willful infringement. (Answer ¶ 71; JX 3A at 004; CX 1337). Unocal is "asking for triple damages for Valero's willful infringement." (CX 703 at 001; Lane, Tr. 3041; CX 1337 at 011).
2713. Unocal further requested in the Valero litigation either an injunction barring future infringement of the '126 and '393 patents or a mandated license to the patents at the rate of 5.75 cents per gallon for all infringing gallons. (CX 1337 at 011).
2714. The allegations in Unocal's complaint against Valero show that Unocal understands that its patent portfolio has a substantial impact in the marketplace. Unocal explicitly incorporated into its complaint this statement from one refiner's CEO: Nobody can blend around all five [RFG] patents; it is just impossible." (CX 1337 at 006).
2715. Unocal' further alleged in its complaint against Valero that Valero disclosed in SEC filings that it might be required to pay royalties for use of Unocal's RFG patents. (CX 1337 at 006).
2716. The refiners (including Valero) sued for patent infringement by Unocal account for approximately three quarters of California's gasoline supply. (CX 1720A at 032 (Shapiro Expert Report)).

**B. Unocal Has Enforced its Patents Through Licensing Activities.**

2717. {

} (JX 3 at 004, *in camera*; Strathman, Tr. 3701, *in camera*).

**1. Unocal Licensed Its Patents and Is Actively Seeking to Sign More Licensees in California.**

2718. Unocal recognized as early as 1995 that licensing could be “quite lucrative considering the volume of gasoline sold in California.” (Lane, Tr. 3036-3038).

2719. Unocal’s patents have created “a new business” for Unocal. (CX 441 at 002; CX 7072 (Williamson, Dep. at 12-13)). Unocal has publicly announced that “pursuing and negotiating licensing agreements for reformulated gasoline patents with refiners, blenders and importers” “strategic focus” of Unocal. (CX 614 at 005; CX 7072 (Williamson, Dep. at 28)).

2720. Unocal has formally announced that it has projected license fee revenues of \$75 to \$150 million dollars per year. (CX 441 at 003; CX 7072 (Williamson, Dep. at 16-17); Strathman, Tr. 3626; CX 610 at 068). Charles Williamson, Unocal’s current chairman and CEO, openly discussed this \$75 to \$150 million revenue projection at May 21, 2001 annual shareholders meeting (CX 441 at 002-003; CX 7072 (Williamson, Dep. at 16-17)), and has said that “I think the patent is a piece of intellectual capital property that is turning into a new business for us” (referring to the five patents collectively). (CX 441 at 002; CX 7072 (Williamson, Dep. at 12-13)).

2721. Unocal has projected various annual rates for its patent royalties. One projection (marked July 18 board meeting) assumed an average rate of 2.5 cents per infringing production, and recognized revenue potential was estimated at \$178 million dollars annually. (CX 635 at 001); *see also* (CX 468 at 002 (assuming revenues of \$200 million per year in doing tax analysis)).

2722. Unocal has announced its intention to offer uniform licensing terms to all non-litigating refiners, blenders and importers for the use of its patent portfolio. (Answer, ¶ 72). These standardized terms provide for a sliding scale of royalties for the patents ranging from 1.2 to 3.4 cents per gallon of infringing gasoline, with the royalty rate decreasing as the infringement rate increases. (Answer, ¶ 72).

2723. Unocal has indicated that any licensing rate would be even higher for refiners who have litigated with Unocal. (Strathman, Tr. 3634, 3637-3639; CX 435).

2724. {  
} (CX 2009, *in camera*).
2725. {  
} (CX 2014, *in camera*).
2726. {  
} ({  
}); CX 2012, *in camera*).
2727. {  
} (CX 2013, *in camera*).
2728. {  
} (Strathman, Tr. 3728-3729, *in camera*).
2729. {  
} (CX 2020, *in camera*).
2730. {  
} (CX 2018, *in camera*; CX 2019, *in camera*).
2731. {  
} (CX 2018, *in camera*; CX 2019, *in camera*; Strathman, Tr. 3711, *in camera*).
2732. {  
} (CX 2011, *in camera*).
2733. {  
} (CX 2017, *in camera*).
2734. {  
} (CX 2009; CX 2011;  
CX 2012; CX 2013; CX 2014; CX 2017; CX 2018; CX 2020, all *in camera*). {  
} (Strathman,  
Tr. 3703, *in camera*).

2735. {  
} (CX 2017 at 002, *in camera*; Strathman Tr. 3703, 3754, *in camera*).

2736. {  
} (CX 1800 at 002, *in camera*; Strathman, Tr. 3736-3737, *in camera*; CX 2009 at 001, *in camera*; CX 2011 at 001-002, *in camera*; CX 2012 at 001-002, *in camera*; CX 2013 at 001, *in camera*; CX 2014 at 001-002, *in camera*; CX 2017 at 001, *in camera*; CX 2018 at 001-002, *in camera*; CX 2020 at 001, *in camera*).

2737. {  
} (CX 2000, *in camera*; CX 2009 at 012, *in camera*; CX 2012 at 016-017, *in camera*; CX 2013 at 012-013, *in camera*; CX 2014 at 014, *in camera*; CX 2019 at 003-007, *in camera*; Strathman, Tr. 3704-3705, 3711, *in camera*; Dowling, Tr. 3779, *in camera*).

2738. {  
} (Strathman, Tr. 3722, *in camera*).

3779, *in camera*).

2739. {  
} (CX 2009 at 001-002 *in camera*; see also CX 2011 at 002-003, *in camera*; CX 2012 at 002-003, *in camera*; CX 2013 at 001-002, *in camera*; CX 2014 at 002-003, *in camera*; CX 2017 at 002, *in camera*; CX 2018 at 002-003, *in camera*; CX 2020 at 002-003, *in camera*; {  
}, *in camera*; Dowling, Tr. 3784, *in camera*)(emphasis added).

2740. {  
} (CX 2009 at 003, *in camera*; CX 2011 at 003, *in camera*; CX 2012 at 003, *in camera*; CX 2013 at 002, *in camera*; CX 2014 at 003, *in camera*; CX 2017 at 002, *in camera*; CX 2018 at 003, *in camera*; CX 2020 at 003, *in camera*).

2741. {

} (CX 2009 at 012, *in camera*; CX 2012 at 016, *in camera*;  
{ }, *in camera*; CX 2013 at 012, *in camera*; see also CX 2014 at  
014, *in camera*; CX 2011 at 011-013, *in camera*; CX 2018 at 011-013, *in camera*; CX  
2020 at 014-017, *in camera*).

2742.

} (CX 2009 at 003-004, *in camera*; CX 2011 at  
003-005; CX 2012 at 005-006, *in camera*; CX 2013 at 004-005, *in camera*; CX 2014 at  
005, *in camera*; CX 2017 at 002-004, *in camera*; CX 2018 at 004, *in camera*; CX 2020 at  
006, *in camera*; Strathman, Tr. 3717-3721).

2743. {

} (Strathman, Tr.  
3717-3721, *in camera*; CX 684 at 001, *in camera*).

2744. {

} (CX 684 at 001, *in camera*; Jessup, Tr.  
1338-1339, 1460-1461, *in camera*, 1608-1609). {  
}  
(Jessup, Tr. 1339, 1460-1461, *in camera*). {  
}  
} (CX 684 at 001, *in  
camera*; Jessup, Tr. 1338, 1460-1461, *in camera*).

2745. The consulting firm Jacobs Consultants (formerly PACE) performs the same type of calculation for Vitol, one of Unocal's licensees. (Hepper, Tr. 4085-4087, *in camera*; CX 2193 at 012-041).

2746. Measuring infringement through matching the numerical claims of the patents is rational because refiners routinely use or contribute to the use of Unocal's claimed methods of making and using gasoline. Because Unocal understands this fact, {

} (Dowling, Tr. 3782, *in camera*).

2747. {

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} (CX 2000 at

001, *in camera*; Strathman, Tr. 3717-3718, *in camera*).

2748. Even if Unocal did not equate matching the numerical limitations with infringement, Unocal's counsel's testimony would further confirm that industry participants have a practical economic definition of infringement that may or may not correspond with legal infringement – but is nevertheless used to make economic decisions concerning patented technology. {

} (Hepper, Tr. 4089, *in camera*); *see also* (Dowling, Tr. 3791-3792, *in camera*); {

2749. {

} (

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}, *in*

*camera*).

2750. {

} (Dowling, Tr. 3791-3792, *in camera*).

2751. {

} (Strathman, Tr.

3706, *in camera*).

2752. In Unocal's agreement to sell its refining assets to Tosco, Unocal explicitly retained all rights to its RFG patents. (CX 2023 at 003). As part of the sale of Unocal's refinery

assets to Tosco, Tosco agreed to take a license to Unocal's RFG patents at the lowest rate at which Unocal had licensed those patents. (CX 2023 at 009-010).

2753. {  
} (Strathman, Tr. 3733-3734, *in camera*; CX 466 at 001, *in camera*).

2754. {  
} (CX 466 at 004).

2755. {  
} (CX 444, *in camera*).

2756. A Unocal memo dated March 1, 2001 regarding the "Current Status of RFG," discussed license negotiations with eight refiners, {

E  
} (CX 436 at 002, *in camera*).

2757. The total impact of Unocal's royalties from litigation and licensing could be approximately \$160 million per year. (Shapiro, Tr. 7098). The royalties potentially owed Unocal for past infringement by California refiners could be as high as \$1.9 billion. (CX 1720A at 026 (Shapiro Expert Report)).

### **XXIII. Unocal Engaged in Exclusionary Deceptive Conduct.**

#### **A. Unocal's Deceptive Conduct Is Inefficient and Should Be Condemned.**

2758. Unocal's deceptive conduct in this case constitutes economically inefficient opportunism, which should be condemned. The reasons for this are explained by Complaint Counsel's economic expert, Dr. Carl Shapiro. (CCPF ¶¶ 2759-2789).

2759. Dr. Shapiro is the Transamerica Dr. of Business Strategy at the Haas School of Business at the University of California at Berkeley, where he has taught since 1990. Dr. Shapiro also has an appointment in the department of economics, and directs the Institute of Business and Economic Research at Berkeley. (CX 1720A at 003; Shapiro, Tr. 7038). Dr. Shapiro's academic focus has been on the economics of innovation, as well as antitrust, intellectual property issues as they relate to competition, and competitive strategy. (Shapiro, Tr. 7039).

2760. Prior to joining the faculty at Berkeley, Dr. Shapiro was on the faculty at Princeton University for 10 years. (Shapiro, Tr. 7038). Dr. Shapiro has a Ph.D. in economics from the Massachusetts Institute of Technology. (Shapiro, Tr. 7036). Dr. Shapiro served as the deputy assistant attorney general for antitrust in Antitrust Division of the Department of Justice from 1995 to 1996. (Shapiro, Tr. 7038-39).
2761. Dr. Shapiro has published dozens of articles on economic topics relating to antitrust, innovation and competitive strategies. (CX 1720A at 043-049 (Shapiro Expert Report)). Dr. Shapiro has also served as the Editor of the *Journal of Economic Perspectives*, a leading economics journal published by the American Economic Association. (CX 1720A at 003 (Shapiro Expert Report)).
2762. Dr. Shapiro has also written articles, performed research and done consulting on standard setting issues. (Shapiro, Tr. 7039). Dr. Shapiro's publications relating to standard setting include several chapters in Dr. Shapiro's book with Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Harvard Business School Press, 1999) and "The Art of Standards Wars," (*California Management Review*, Winter 1999). (CX 1720A at 003).
2763. Dr. Shapiro has also written articles concerning the antitrust implications of standard setting in "Navigating the Patent Thicket: Cross Licenses, Patent Pools and Standard Setting," (in *Innovation Policy and the Economy*, Adam Jaffe, Joshua Lerner, and Scott Stern, eds., National Bureau of Economics, 2001) and in "Setting Compatibility Standards: Cooperation or Collusion?," (in *Expanding the Bounds of Intellectual Property*, Rochelle Dreyfuss, Diane Zimmerman, and Harry First, eds., Oxford University Press, 2001). (CX 1720A at 003).
2764. Dr. Shapiro has had a "real focus" on technology, including patents, licensing, innovation, antitrust in high-technology industries, and economics of innovation, for at least the past 10 years. (Shapiro, Tr. 7039-7040).
2765. In this case, Dr. Shapiro was asked to evaluate the economic effects of Unocal's deceptive conduct in terms of market power, prices and costs. (Shapiro, Tr. 7040-7041). Dr. Shapiro was also asked to evaluate the relevant markets in which his analysis could be conducted. (Shapiro, Tr. 7040-7041).
2766. One key part of Dr. Shapiro's analysis was the focus on the economics of opportunism. (Shapiro, Tr. 7044).

### **1. Definition of Opportunism.**

2767. "Opportunism" is a standard term in the field of economics that refers to situations where one party, typically through misrepresentations or deception, can gain a commercial

- advantage over others by creating misleading impressions or asymmetric or distorted information that then affects trading, negotiations, transactions and the like. (Shapiro, Tr. 7044-7045). Or, as Unocal economic expert Dr. David Teece explained, opportunism means “self-seeking behavior coupled with guile.” (Teece, Tr. 7667).
2768. By engaging in opportunism, an input supplier is able to earn a return that is *greater* than would result from competition. More specifically, deception can give a return that is far out of proportion to the actual contribution by the input supplier. (CX 1720A at 013 (Shapiro Expert Report) (emphasis in original)).
2769. The theory of economic opportunism includes consideration of the economic effects of opportunism, including analysis of the gains that a party may make from engaging in opportunism, and determining the conditions under which such gains are made. The theory also considers the proper remedies for opportunism and how to avoid becoming a victim of opportunism. (Shapiro, Tr. 7045).
2770. The theory of economic opportunism is part of a subfield of economics called transaction cost economics, which addresses questions of how parties structure their transactions where there may be asymmetric information. (Shapiro, Tr. 7046).
2771. The theory of economic opportunism can be illustrated mathematically. (Shapiro, Tr. 7047-7060, as illustrated by CX 7096; CX 1720A at 010-012 (Shapiro Expert Report); CX 1799A at 005-007 (Shapiro Expert Rebuttal Report)).
2772. The following example illustrates the theory of opportunism. Assume there is a consumer interested in renting an apartment, Apartment No. 1. (Shapiro, Tr. 7051-7053, as illustrated by CX 7096 at 001).
2773. The next best alternative is Apartment No. 2. In this example, the cost to move into Apartment No. 2 is \$1,500 and the rent is \$12,000. Thus, the total costs for Apartment No. 2 is \$13,500. (Shapiro, Tr. 7054, as illustrated by CX 7096 at 001).
2774. The cost to move into Apartment No. 1 is \$2,500. In addition, Apartment No. 1 is bigger and nicer than Apartment No. 2, so the consumer is willing to pay \$6,000 more for Apartment No. 1. The rent has to be negotiated. (Shapiro, Tr. 7052-7054, as illustrated by CX 7096 at 001).
2775. In this example, the consumer would be willing to pay \$17,000 in rent for Apartment No. 1 prior to moving in. This can be derived by taking the total costs of Apartment No. 2 (\$13,500), subtracting the moving costs for Apartment No. 1 (\$2,500), and then adding the quality adjustment for Apartment No. 1 (\$6,000). (Shapiro, Tr. 7054-7055, as illustrated by CX 7096 at 001).

### **Economics of Opportunism**

***Initial Negotiations***

	Apartment # 1	Apartment # 2
Moving Costs (Expected)	\$2, 500	\$1, 500
Rent	X	\$12,000
Quality Adjustment (Expected)	-\$6,000	
Adjusted Total Cost	= X - \$3,500	= \$13,500
Initial Maximum Rent	= \$17,000	

(CX 7096 at 001 (emphasis in original)).

2776. However, if the landlord lies about the true rent of Apartment No. 1 and seeks to renegotiate the rent after the consumer has moved in, the consumer will be in a weaker bargaining position. The cost of the next best alternative (Apartment No. 2) remains \$13,500, and the quality adjustment for Apartment No. 1 remains \$6,000. (Shapiro, Tr. 7054, as illustrated by CX 7096). However, the moving costs have been sunk, so that the consumer is now willing to pay \$19,500 to rent Apartment No. 1. (Shapiro, Tr. 7057, as illustrated by CX 7096 at 002).

2777. The \$2,500 spent on moving costs constitutes a “specific investment,” which is only useful if the consumer stays in Apartment No. 1. If the consumer moves into Apartment No. 2, “it will turn out those \$2,500 costs were wasted because you will now incur the \$1,500 costs as well to move to apartment 2.” (Shapiro, Tr. 7061-7062, as illustrated by CX 7096 at 002). This type of investment is also referred to as “asset specificity” in the literature. (Shapiro, Tr. 7062).

**Economics of Opportunism  
*Negotiations After Moving***

	Apartment # 1	Apartment # 2
Moving Costs (Expected)	-----	\$1, 500

Rent	X	\$12,000
Quality Adjustment (Expected)	-\$6,000	
Adjusted Total Cost	= X - \$6,000	= \$13,500
Maximum Rent After Moving	= \$19,500	

*Maximum rent after moving is equal to initial maximum rent **plus** \$2,500 moving costs*

(CX 7096 at 002 (emphasis in original)).

2778. Assuming the same set of facts, assume also that the consumer enjoys Apartment No. 1 more than anticipated. Therefore, the quality adjustment would be increased to \$8,000. However, if the landlord lies about the true rent and seeks to renegotiate the rent after the consumer has moved in, the consumer will be in an even weaker bargaining position. Now, the consumer is willing to pay \$21,500 to rent Apartment No. 1. (Shapiro, Tr. 7059, as illustrated by CX 7096 at 003).

**Economics of Opportunism**  
***Apartment # 1 Nicer Than Expected***

	Apartment # 1	Apartment # 2
Moving Costs (Expected)	-----	\$1, 500
Rent	X	\$12,000
Quality Adjustment (Expected)	-\$8,000	
Adjusted Total Cost	= X - \$8,000	= \$13,500
Quality-Adjusted Maximum Rent After Moving	= \$21,500	

*Quality-adjusted maximum rent after moving is equal to maximum initial rent **plus** \$2,500 moving costs **plus** unexpected \$2,000 quality adjustment.*

(CX 7096 at 003 (emphasis in original)).

2779. Because the landlord knows that the consumer would be willing to pay more after the consumer has moved in, “the landlord can confidently know” that the landlord will “be in a stronger bargaining position after the individual has moved in, and then of course this would then create a potential or an incentive, an economic incentive, for the landlord to engage in this type of misrepresentation if there were no other penalties for doing so.” (Shapiro, Tr. 7058).

## 2. The Connection Between Opportunism and Market Power.

2780. Opportunistic conduct connects directly to market power. So long as the bargaining power between the input supplier and the consumer does not shift, and so long as the magnitude of the sunk costs (the costs of moving) is known to both sides in the negotiations, bargaining theory predicts that the rent (or royalty rate) charged *ex post* would be higher than the royalty rate resulting from *ex ante*. (CX 1720A at 013).
2781. A supplier may gain bargaining power over customers after those customers make specific investments that will be stranded if the customer is then forced to switch to another supplier, a strategy sometimes characterized as opportunism. (CX 1799A at 002 (Shapiro Expert Rebuttal Report); RX 1162A at 028-029 (Teece Expert Report); RX 1164A at 186-188) (Griffin Expert Report)). The apartment example demonstrates that “the bargaining position of the seller *ex post* is much stronger than *ex ante* and in a predictable way based on the costs that were incurred that will be wasted or stranded if the individual then picks another choice.” (Shapiro, Tr. 7060-7061).
2782. In addition, there are other economic elements that can “cause opportunism to shift power in the favor of the seller besides the specific investments. In particular, the passage of time can mean the alternatives that were initially available to the buyer are less attractive, perhaps simply because it takes time to develop or prepare for adopting that alternative.” (Shapiro, Tr. 7062-7063).
2783. There are two elements that specifically led to enhanced power for Unocal. First, there are the specific investments which are analogous to the moving costs in the apartment example. These costs refer to the capital investments made by refiners that are specific to the CARB Phase 2 rules. (Shapiro, Tr. 7064, as illustrated by CX 7097; CCPF ¶¶ 3703-3762).
2784. The second element that leads to enhanced power for Unocal are the “adjustment costs,” which reflect the fact that, with the passage of time, “CARB’s options to seek emissions reductions in other areas and CARB’s flexibility generally was reduced with that passage of time.” (Shapiro, Tr. 7065, as illustrated by CX 7097; CCPF ¶¶ 3763-3780).
2785. Deceptive, opportunistic conduct leads *ex post* to the usual allocative inefficiencies associated with monopoly power. (CX 1720A at 013 (Shapiro Expert Report)). In the presence of substantial specific investments, subsequent offers to license intellectual property that are substantially less favorable to licensees and are enabled by deception reflect opportunism and *ex post* monopoly power. Such monopoly power – as distinct from any *ex ante* market power that may be presumed to reflect the superiority of the patented technology – harms consumers and represents a return to deception, not a return to innovation. (CX 1720A at 014 (Shapiro Expert Report)).

2786. As Dr. Shapiro explained: “Opportunism is generally regarded as an inefficiency associated with market transactions in cases where the trading parties could not, or did not, fully specify the conditions on which they would conduct business in the future, or in cases where one party was misled by and relied upon the other.” (CX 1720A at 013 (Shapiro Expert Report)). Unocal economic expert Dr. Teece admitted that opportunism means the fact that people will generally act in their own self-interest and have an incentive to do so in ways that may involve guile. (Teece, Tr. 7667).
2787. Opportunism associated with *ex post* lock-in can be especially costly when government regulations are involved. With government regulations, individual firms or groups of firms cannot break off and adopt a new specification, since they are required to comply with the regulations. Since government regulations are mandated and industry members cannot split off and choose not to comply, *ex post* monopoly power can be especially strong when government regulations are involved. (CX 1720A at 013 (Shapiro Expert Report)).
2788. In cases where changing specifications requires collective action, the costs of switching to a new specification include the costs of *coordinating* to make such a change as well as the specific costs already incurred to comply with the specification initially selected. (CX 1720A at 013 (Shapiro Expert Report)) (emphasis in original).
2789. According to Unocal’s expert Dr. Teece, “The principal antitrust concern with regulatory standards is that interested parties may be able to coopt the regulatory process to protect their market position against potential competitors.” (Teece, Tr. 7713).

**B. Exclusionary Conduct Through Deception and Misrepresentation Has No Efficiency or Other Justification.**

**1. There Are No Business Justifications for Unocal’s Misrepresentations to CARB.**

2790. Unocal has identified no business justifications for misrepresenting to CARB and Auto/Oil that its research and data were “non-proprietary” or “in the public domain.” (CCPF ¶¶ 2791-2796).
2791. As Dr. Shapiro explained, there is no economic analysis that lying to rational consumers can benefit those consumers. (CX 1799A at 017-018 (Shapiro Expert Rebuttal Report)).
2792. In Dr. Shapiro’s expert opinion, “I consider it rather obvious that lying disrupts and undermines the competitive process itself.” (CX 1799A at 018 (Shapiro Expert Rebuttal Report)). Consumers “deserve” a “competitive market and a competitive price for the technology, not a price based on deception.” (Shapiro, Tr. 7191).

2793. Deception deprives the buyer of a chance to truly benefit from *ex ante* competition. Deception short-circuits the competitive process. Requiring a firm that has lied to make good on its earlier representations goes a long way towards restoring competition. (CX 1799A at 018 (Shapiro Expert Rebuttal Report)).
2794. Even Unocal's own expert, Dr. Teece admitted that deliberate opportunism in the standard-setting process should not be supported. (Teece, Tr. 7672). Similarly, Dr. Teece would not support lying in the standard-setting context. (Teece, Tr. 7672).
2795. Unocal's most senior executives agree that companies should not benefit from deceptive behavior. If it is found that in gaining the ability to collect these royalties Unocal was deceptive to CARB, Chairman and CEO Charles Williamson said Unocal, "as a company, [doesn't] expect to realize gains or benefits from fraudulent behavior." (CX 7072 (Williamson, Dep. at 19-20)). According to Mr. Williamson, Unocal "shouldn't profit from deceptive conduct." (CX 7072 (Williamson, Dep. at 21)).
2796. Mr. Williamson's predecessor, Richard Stegemeier, concurs and testified that corporations should not benefit from deceptive conduct. (CX 7065 (Stegemeier, Dep. at 144)).

**2. There Are No Business Justifications for Unocal's Failure to Disclose Its Patent to CARB and Auto/Oil.**

2797. There are no business justifications to support Unocal's failure to disclose its patent to CARB and Auto/Oil in this case. (CCPF ¶¶ 2798-2816).
2798. Any concerns about disclosures of patents in standard setting organizations are not relevant, since this case is not about a disclosure requirement, but rather is about not engaging in deceptive and misleading conduct. (CX 1799A at 030 (Shapiro Expert Rebuttal Report)).
2799. No witness has endorsed the idea that patent holders should mislead others about whether technology is proprietary. Indeed, Unocal's patent expert Nancy Linck has never advised a client to state that technology was in the public domain knowing that the client planned to assert proprietary rights over that technology. (Linck, Tr. 7869). Ms. Linck does not know of any attorney who has advised clients to state that technology with a patent application pending is in the public domain. (Linck, Tr. 7869-7870).
2800. Unocal's patent expert Ms. Linck does not "know of anyone who would be advised to disclose a claimed invention and say that that was in the public domain." (Linck, Tr. 7871).
2801. Unocal's patent expert Ms. Linck would never intend to mislead a regulatory agency about the existence of a patent. (Linck, Tr. 7875). Unocal's patent expert has never

advised a client to state that technology with a pending application pending was in the public domain. (Linck, Tr. 7869).

2802. Companies, including Unocal, have disclosed pending patent applications to CARB. For example, Unocal disclosed its pending patent on gasoline detergent additives to CARB in a presentation on July 28, 1989. (Croudace, Tr. 544-545; CX 131 at 012; Venturini, Tr. 187-189; CX 1093 at 027). One of Unocal's slides to CARB states: "A Unique Unocal Patent Pending Development." (CX 131 at 012; Venturini, Tr. 187-189; CX 1093 at 027). During the July 28, 1989 presentation to CARB, Unocal advocated its ideas for the proposed additive regulation. (CX 131 at 001).
2803. Unocal disclosed its pending patent on gasoline detergent additives to a trade association Western Marketing Technology Conference. (Croudace, Tr. 673-674).
2804. During the development of the diesel regulations, Chevron disclosed to CARB that it had a patent pending on diesel formulations at the time it sought certification from CARB. (Ingham, Tr. 2740, 2750-2751; CX 1704; RX 1104). Chevron ultimately decided to dedicate its diesel patents to the public. (Ingham, Tr. 2751; RX 1104).
2805. Unocal management knew that Unocal employees were going disclose the gasoline additive technology, and the fact of the pending patent to CARB. During a meeting with Roger Beach in July 1989, Unocal managers "expressed [Unocal's] conviction that CARB will definitely mandate the use of additives in both diesel fuel and gasoline." (CX 1215 at 001). At that meeting, there was "a consensus that Unocal should interact directly with CARB prior to implementation of such regulations." (CX 1215 at 001).
2806. The slides that Unocal used to inform CARB that Unocal's new intake system detergent was "A Unique Patent Pending Development" was sent, on July 19, 1989 by Dr. Alley (Vice President of Products and Process Research) to Mr. A.L. Felderman (Vice President of Refining), Mr. C.R. Warnock, and Mr. G.A. Walker (Manager of the Los Angeles Refinery) for their review. (CX 1215 at 001, 029; Miller, Tr. 1393-1394). In addition, Dr. Miller, who was involved in preparing the slides, reviewed the slides before they were sent out. (Miller, Tr. 1395-1396).
2807. Inventors are permitted to share their pending patent applications with anyone that they choose to do so. (Sarna, Tr. 6430-6431).
2808. It is a common practice in the oil and gas industry for companies to ask for royalties or license fees for pending patents. (Sarna, Tr. 6431-6432).
2809. Good patent practice does not always dictate maintaining the confidentiality of a pending patent application. (Linck, Tr. 7836). Unocal's patent expert, Nancy Linck is employed by Guilford Pharmaceuticals. Guilford Pharmaceuticals discloses that it has patent applications pending on various technologies. (Linck, Tr. 7836). In its 1998 SEC Form

10-K, for example, Guilford Pharmaceuticals disclosed that it had filed a number of patent applications in the United States and internationally related to its proprietary neuroimmunophilin ligand technology. (Linck, Tr. 7837). In its 2003 SEC Form 10-K, Guilford Pharmaceuticals stated that it had seven pending U.S. patent applications on its cyclophilins technology. (Linck, Tr. 7838).

2810. In other years, Unocal's patent expert's employer, Guilford Pharmaceuticals, filed Form 10-K's that disclosed the existence of patent applications on various technologies. (Linck, Tr. 7839). On its Web site, Guilford Pharmaceuticals discloses that it has patent applications pending on various technologies. (Linck, Tr. 7840-7841).
2811. Unocal's patent expert Nancy Linck admits that her employer, Guilford Pharmaceuticals, is not misleading anybody by disclosing the existence of U.S. patent applications on various technologies. (Linck, Tr. 7840).
2812. Ms. Linck confirms that firms do disclose the existence of patent applications, and sometimes notify the public of the existence of patent applications by marking their products "patent pending." (Linck, Tr. 7841, 7843).
2813. To the extent that trade secrets are sometimes protected by a decision not to make a pending patent public, that justification is substantially undercut here. Unocal disclosed the research, data, and equations to CARB and the refiners. As Unocal explained during the '393 patent litigation: "CARB itself *recognized the validity and importance of the invention* and used some of its contributions to the knowledge of fuel property effects on exhaust emissions in adopting its "Phase 2" regulations for reformulated gas." (CX 1318 at 12 (Emphasis added); *see also* (Segal, Tr. 5617-5620; CX 1592; CX 1593).
2814. These disclosures effectively disclosed the invention. Thus, the invention itself was no longer a trade secret at the time that Unocal's patent was pending. (CCPF ¶¶ 789-799).
2815. Mr. Derr, the former CEO of Chevron, who has nearly forty years of experience in the oil industry, believes that Unocal's actions in seeking to monetize its patents was unethical. (Derr, Tr. 5113-5114).
2816. Mr. Derr told two outside directors of Unocal that he believed Unocal had committed unethical conduct regarding its decision to monetize its RFG patents. (Derr, Tr. 5117-5118). It was extremely unusual for Mr. Derr to express his opinions to outside directors of another company, but he "felt so strongly about the issue," that he felt he needed to inform Unocal's directors. (Derr, Tr. 5120).

#### **XXIV. Relevant Markets.**

2817. In this case, there are two relevant product markets. The first market is a technology market, consisting of the low emission reformulated gasoline technology required to

produce gasoline compliant with CARB's summertime RFG regulations. (CX 1720A at 021 (Shapiro Expert Report); Shapiro, Tr. 7065; CX 1799A at 002 (Shapiro Expert Rebuttal Report); RX 1162A at 047 (Teece Expert Report)).

2818. A second relevant product market consists of CARB-compliant summertime reformulated gasoline made available for sale in California. (CX 1720A at 023 (Shapiro Expert Report)).

**A. A Firm That Controls the Technology for Producing Gasoline Compliant with CARB's Summertime Reformulated Gasoline Regulations Can Profitably Price That Technology above the Competitive Levels.**

**1. Technology Markets in General.**

2819. Patent licensing arrangements are market transactions that occur in what economists call a "technology market." (Shapiro, Tr. 7065-7066; CX 1720A at 020 (Shapiro Expert Report)).

2820. The idea of a technology market has been well-accepted in the field of economics for many years. (Shapiro, Tr. 7065-7066). Technology markets are "used by economists and are described as well by the Justice Department and the Federal Trade Commission in their intellectual property guidelines." (Shapiro, Tr. 7066). Unocal's economic expert Dr. David Teece agrees "that the Joint DOJ/FTC Antitrust Guidelines for the Licensing of Intellectual Property provide useful guidance in identifying the relevant scope of the technology market." (RX 1162A at 047-048).

2821. Technology markets are an example of an "input market." Just as an automobile manufacturer uses steel as an input to make cars, a chemical company may use a patented process technology to make its final product. Technology markets are conceptually similar to traditional input markets and are amenable to analysis using familiar analytic concepts. (CX 1720A at 020 (Shapiro Expert Report)).

2822. The "producers" in a technology market possess technology which they provide to consumers who pay for the right to use the relevant technology. An example of a producer in the technology market is a patent-holder. Licensing agreements typically establish the costs and terms governing the use of the relevant technology. (Shapiro, Tr. 7065-7066).

2823. Technology markets focus attention on competition in the provision of technology. As with other inputs, the presence of close substitutes for a given patented technology reduces the market power of the patent holder controlling the patented technology. (CX 1720A at 021 (Shapiro Expert Report)).

2824. To define the scope of a particular technology market, it is necessary to identify the component parts of the market, namely producers, consumers, and the traded commodity or technology. To define the relevant market for antitrust purposes, the constituents of the market must exist in a scope such that collectively, the suppliers of the commodity or technology in the market could profitably raise the price of the commodity or technology significantly above competitive levels. In technology markets, competitive and supra-competitive price levels can be measured according to licensing fees paid for the use of a proprietary technology. (CX 1720A at 021 (Shapiro Expert Report)).

## 2. The Technology Market in this Case.

2825. The technology market relevant to this case consists of “*low emissions RFG technology required to produce gasoline compliant with CARB’s summertime RFG regulations.*” (CX 1720A at 021 (Shapiro Expert Report)(emphasis in original); Shapiro, Tr. 7065; CX 1799A at 002 (Shapiro Expert Rebuttal Report); RX 1162A at 047 (Teece Expert Report)).

2826. Unocal’s economic expert, Dr. Teece, concurs that the relevant technology market in this case consists of technology required to produce low emissions reformulated gasoline compliant with CARB’s summertime RFG regulations. (RX 1162A at 047). Dr. Teece believes that such a definition of the technology market is reasonable. (Teece, Tr. 7528).

2827. The subject matter of Unocal’s reformulated gasoline patents is technology that exists within the relevant technology market to this case. The unpatented technical know-how used by refiners to blend around Unocal’s RFG patents, to the extent blending around is possible, constitutes another technology within the relevant technology market. (CX 1720A at 021 (Shapiro Expert Report)).

2828. Oil refiners that produce CARB-compliant summertime reformulated gasoline constitute the consumers in the technology market relevant in this case. (CX 1720A at 021 (Shapiro Expert Report); Shapiro, Tr. 7066-7067).

2829. The relevant geographic market for low emissions reformulated gasoline technology required to produce gasoline compliant with CARB’s summertime RFG regulations is worldwide, *i.e.*, suppliers with suitable technology can compete in this market regardless of their location. (CX 1720A at 021 (Shapiro Expert Report); Shapiro, Tr. 7067).

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(Shapiro, Tr. 7208-7209, *in camera*; CX 1720A at 022 (Shapiro Expert Report)).

2831. It is “absolutely wrong” to say that economists are not concerned about the exclusion from the market of alternatives that are not superior in terms of quality or price. “It’s a very troubling thing that needs to be cleared up and combated.” (Shapiro, Tr. 7391).
2832. To be considered a monopolist over the low emissions RFG technology required to produce CARB-compliant gasoline, a producer would need the ability to profitably sustain prices for its technology significantly above the competitive level. (CX 1720A at 021 (Shapiro Expert Report)).
2833. A single firm controlling the low emissions RFG technology required to produce CARB-compliant gasoline could raise and profitably sustain prices significantly above competitive levels. (CX 1720A at 21 (Shapiro Expert Report)).
2834. The profit-maximizing price for such a hypothetical monopolist depends on the elasticity of demand for the technology. The more inelastic the demand for low emissions RFG technology, the greater the profit-maximizing price charged by the hypothetical monopolist. (CX 1720A at 021 (Shapiro Expert Report)).
2835. Because low emissions reformulated gasoline technology is an input used in the production of clean-burning gasoline, demand for reformulated gasoline technology is dependent on the downstream demand for CARB-compliant gasoline. Economic theory shows that the elasticity of demand for the technology is related to several factors, including (1) the elasticity of demand for CARB-compliant gasoline; (2) the proportion of the total variable cost of CARB-compliant gasoline accounted for by RFG technology, and (3) the economic viability of substitute technologies. (CX 1720A at 021-022 (Shapiro Expert Report)).
2836. The greater the cost to switch to alternative technologies, the more inelastic will be demand for the low emissions RFG technology. (CX 1720A at 022 (Shapiro Expert Report)).
2837. The greater the inelasticity of demand for downstream CARB gasoline, the greater the inelasticity of demand for the low emissions technology needed to make CARB reformulated gasoline. (CX 1720A at 022 (Shapiro Expert Report)).
2838. The downstream demand for CARB summertime RFG is quite inelastic, indicating that the elasticity of demand for low emissions technology is also inelastic. (CX 1720A at 022 (Shapiro Expert Report)). Dr. Teece agrees that demand for gasoline is inelastic, reporting an estimate of  $-0.25$ . (CX 1346 at 031). CARB price elasticity studies determined demand for gasoline to be inelastic as well. (CX 5 at 142).

2839. The smaller the proportion of the variable cost of the CARB-compliant reformulated gasoline that is comprised of the technology, the more inelastic is the demand for the low emissions technology. Crude oil costs account for the bulk of the variable cost of CARB-compliant gasoline, with the RFG technology being a smaller portion of variable cost. Since low emissions technology accounts for a very small portion of variable cost, demand for such technology is even more inelastic than demand for gasoline. (CX 1720A at 022 (Shapiro Expert Report)).

**B. A Firm That Controls All CARB-Compliant Summertime Reformulated Gasoline Would Be Able to Profitably Price that Gasoline Above the Competitive Levels.**

2840. A second relevant product market consists of CARB-compliant summertime reformulated gasoline available for sale in California. (CX 1720A at 023 (Shapiro Expert Report)).

2841. In California, low Reid Vapor Pressure standards apply only during the warmer weather months, which range from April 1 through October 31, depending upon the location within the state. (Cal. Code Regs. tit. 13, (section symbol) §§ 2262.2, 2262.4 (2003); Venturini, Tr. 130-131).

2842. There are no substitutes for CARB-compliant gasoline that may legally be sold in California. (CX 1720A at 023 (Shapiro Expert Report)).

2843. The demand for gasoline in California is highly inelastic. (CX 1720A at 023 (Shapiro Expert Report); CCPF ¶¶ 2834-2839). Consequently, a monopolist in the market for CARB-compliant summertime gasoline for sale in California could profitably raise and sustain prices significantly above the competitive level. (CX 1720A at 023 (Shapiro Expert Report)).

2844. The relevant geographic market for CARB-compliant summertime gasoline is no larger than California. (CX 1720A at 023 (Shapiro Expert Report)).

2845. Although gasoline can be transported considerable distances, it is costly to do so. Refiners and other suppliers located near their customers have lower delivery costs than more distant refiners. Transportation costs limit the ability of distant refiners to constrain prices. (CX 1720A at 23 (Shapiro Expert Report)).

2846. In California, there are product pipelines that leave the state and deliver refined products into Nevada and Arizona. There are not, however, pipelines that deliver refined products from other states into California. The only practical route for moving products into California is by water through the Panama Canal from the Gulf Coast. (Eskew, Tr. 2876).

2847. In his testimony in the case brought by Unocal to enforce its '393 case, Unocal's Dr. Teece testified it would cost refiners 8-10 cents per gallon to import California Phase 2 gasoline from the Gulf Coast. (Teece, Tr. 7654-7655; CX 1332 at 028).
2848. In 1995, Turner Mason, a leading petroleum industry consulting firm, told the California Energy Commission that supplemental sources of CARB Phase 2 RFG "are remote, more costly and require 2-3 weeks response time." (RX 219 at 007). Short-term CARB Phase 2 RFG supply problems resulted from "Rigid CARB 2 specifications – especially for RVP and T50," and the uniqueness of CARB Phase 2 RFG in an isolated region. (RX 219 at 012).
2849. Market participants producing and consuming CARB Phase 2 gasoline view California as a distinct market. For example, in 1995, Turner Mason told the California Energy Commission that supply of CARB Phase 2 gasoline in isolated California was too tight. (RX 219 at 007). Similarly, Exxon has stated that CARB's Phase 2 specifications isolate California as an "island" market. (CX 5067 at 003).